UNITED STATES MARINE CORPS
MARINE CORPS SYSTEMS COMMAND
2200 LESTER STREET
QUANTICO, VIRGINIA 22134-5010

IN REPLY REFER TO:
5720
DON-USMC-2014-008314
3 Sep 14

Akerman LLP
Mr. Timothy J. McDermott
50 North Laura Street
Jacksonville FL 32202

SUBJECT: FOIA DON-USMC-2014-008314

Dear Mr. McDermott:

This responds to your FOIA request dated August 1, 2014, which requests a copy of the following documents:

1. A copy of any and all M32 40mm Multiple Grenade Launcher Test Plans, under which grenades or other munitions were to be fired from such weapons, whether or not those plans or tests thereunder were ever implemented or carried out; **enclosed**

2. Copies of any and all written reports reflecting the testing, results or conclusions of any M32 40mm Multiple Grenade Launcher Testing that were conducted by you at any time, including those under Paragraph #1 above; **enclosed**

3. Copies of any and all video footage capturing, filming or reflecting any test firing of any M32 40mm Multiple Grenade Launcher weapons conducted by you, including any M32 40mm Multiple Grenade Launcher Testing falling within the scope of Paragraph #1 above; **There is no video footage responsive to your request.**

4. Copies of video recordings of gunnery teams using M32 40mm Multiple Grenade Launchers; **There is no video footage responsive to your request.**

5. Data regarding any test firing of any 40mm Multiple Grenade Launcher weapon (including the Milkor M32 model) conducted at any time, including information on types of weapons tested, manufacturer information and serial numbers of weapons included in the tests, ammunition tested, ranges, etc. including those under Paragraph #1 above; and **enclosed**

6. Any analysis, interviews, or other reports of personnel involved in the testing of any M32 40mm Multiple Grenade Launcher at any time, including those under Paragraph #1 above. **enclosed**

In light of the *MCI Worldcom, Inc, v. GSA* decision, the Department of Justice Office of Information and Privacy has advised the Navy Office of the General Counsel that submitter notification in accordance with Executive Order 12,600 should be made whenever an agency receives a FOIA request for documents that contain potentially confidential information in order to obtain and consider any objections to disclosure. Therefore, in accordance with Presidential Executive Order 12,600, we allowed the submitter to review the documents and provide comment.

Pursuant to the aforementioned Executive Order 12,600 request, the submitter provided the Marine Corps Systems Command with proposed redactions pursuant to Exemption 5 U.S.C. § 552(b)(4). These submitter redactions are identified in the enclosed documents.

FOIA Exemption 5 U.S.C. § 552(b)(4) exempts from disclosure (i) voluntarily submitted commercial or financial information provided that the submitter does not "customarily" disclose the information to the public and provided that disclosure would be likely to interfere with the continued and full availability of the information to the government, or (ii) information likely to cause substantial harm to the competitive position of the person from whom it was obtained and likely to impact on the government's ability to obtain reliable information in the future. See Critical Mass Energy Project v. NRC, 975 F2d 871, 879-80 (D.C. Cir. 1992), cert. denied, 113 S.Ct. 1579 (1993); National Parks & Conservation Ass'n v. Morton, 498 F2d 765, 766 (D.C. Cir. 1974); Canadian Commercial Corp. v. Dept. of Air Force, 514 F.3d 37 (D.C. Cir., 2008).

In an effort to minimize further delay we request that you review the enclosures and identify any withheld information that you believe was withheld improperly. MARCORSYSCOM will then determine whether the release of any requested information is proper under the FOIA and provide any additional releasable information in a "final release" letter. If we do not receive any notification from you, which specifically requests the release of any redacted information by September 15, 2014, this letter will become the final response and we will close this FOIA request.

As of September 3, 2014, two hours of search and review (currently billed at $44 per hour) have been expended during the processing of your request. Please remit a check or money order, payable to the Treasurer of the United States in the amount of $88.00 to: COMMANDER, ATTN LAW, MARCORSYSCOM, 2200 LESTER STREET, SUITE 120, QUANTICO VA 22134-5010.

If at any time you are not satisfied that a diligent effort was made to process your request, you may file an administrative appeal with the Assistant to the General Counsel (FOIA) at: Department of the Navy, Office of the General Counsel, ATTN: FOIA Appeals Office, 1000 Navy Pentagon Room 4E635, Washington DC 20350-1000.

For consideration, the appeal must be received in that office within 60 days from the date of this letter. Attach a copy of this letter and a statement regarding why you believe an adequate search was not conducted. Both your appeal letter and the envelope should bear the notation "FREEDOM OF INFORMATION ACT APPEAL". Please provide a copy of any such appeal letter to the MARCORSYSCOM address above.

Any questions concerning this matter should be directed to Mrs. Bobbie Cave at (703) 432-3934 or bobbie.cave@usmc.mil.

Sincerely,

Bobbie Cave

for LISA L. BAKER
Counsel

Appendix A: Test Data Cards

UNITED STATES MARINE CORPS
MARINE CORPS SYSTEMS COMMAND
Ordnance Test Facility
Bldg. #2247 Willis St.
Quantico, VA 22134

TEST ARTICLE CUSTODY RECORD

Origination Date: 8 June 05

PROJECT OFFICER, Capt. John Douglas
Print Name/Rank
MarCorSysCom 432-3626
Unit / Organization **Phone #**

Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULT-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: MGL-140
SERIAL NUMBER: 305002
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
080605/1400	NORTON	OTF	PROCESS	
080605/1430	NORTON	OTF	VISUAL INSP.	
090605	LYONS	Range 15	Test Plan	Test Cards
210605	Shire	Salt Fog OTF	Salt Fog	Test Report

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

DUPLICATION AUTHORIZED

Section 4.1.5 – VISUAL INSPECTION CHECKLIST

Manufacturer / Vendor: MILKOR USA
Serial Number: 305007
Nomenclature / Model Number: MGL-140
OTF ID Number: 051301

	Title	Results:	P – spec. Para#	Requirement
4.1.5 b.(3)	Length	29.5" BUTT STOCK IN 33.0 BUTT STOCK OUT		
4.1.5 b.(4)	Weight	15.38 lbs W/SLING		
4.1.5 b.(5)	Magazine capacity, number of rounds and dimensions of magazine / chamber.	6 RDS. 40x140mm 5.25 L		
4.1.5 b.(6)	Safety type, location, indication method, misfire advance.	-THUMB LEVER SAFETY WITH VISUAL S WHEN ON SAFE - MIS FIRE ADVANCE - WIND-UP SPRING ACTION		
4.1.5 b.(7)	Sights type / description	-OCCLUDED SIGHT/BATTERY POWER - CROSS HAIR TYPE RETICLE		
4.1.5 b.(8)	Accessories, manuals and tools supplied	-OPERATING INSTRUCTIONS - SLING - CLEANING KIT - CARRY BAG W/STRAP		
4.1.5 b.(9)	Noted material discrepancies			
4.1.5 b.(10)	Any actual or possible interference with the weapon's performance.			

Inspections Data Card
date 14 Jun 05

Test Item Description	M60E	Test Procedure Number	
Serial Number	05 BOI - M60 140 305002		

Safety Selector Test
safety selector test. not able to override safety
- will not fire out of time,

Disassembly / Misassembly
only item in field strip is gas piston will not advance without it. can not be installed backwards
No safety related

Parts Interchangebility

Inspections Data Card

date 6/19/05

Tactical Sling

Standing removed sling	18 rds	no issues
K Neeling	24 rds	no issues
Prone	18 rds	no issues
Prone Retracted stock	6 rds	
	66 rds	

Endurance Test Data Card

date 14 June

Test Item Description	M 96 L	Test Procedure Number	TEP 05014 001
Endurance Test Method	actual live fire		
Serial Number	05 BO I	M62 140 - 305002	

Date:	Time:	Condition:	Cycles:	Sub Total:	TIR: If Applicable
14 Jun	1330	tactical firing	66 rds	66	
		Attitude	22 rds	88	
		Ammo Compatibility	3 HE		
			3 smoke		
			3 baton		
			3 rubber ball		
			3 HE		
			3 Illum	106 rds	
		Rate of fire	12 rds	118 rds	
		HEDP	24 rds	142	1 stoppage failed to advance
		CS	20 rds	162	no malfunctions
		HEDP	18 rds	180	no malfunctions
	15:25	HEDP	6 rds 300	6 fired	5 detonate [illegible] possible
		HEDP	18 rds	204	no malfunctions
		Smoke	17 rds		no malfunctions
Alignment Pin		HEDP	72 rds		1 failed to fire
on ejector failed					last rd
			293		
		AP	5 rds		
		non lethal	20 ball		
14 June	18:00		20 baton		

46 non lethal
5 AP
20 CS
20 Smoke

100 TP
149 HEDP

PAGE ____ of ____

Rate of Fire Test Data Card

date 14 Jun

Test Item Description	MILKOR	Test Procedure Number	TEP 05 07F 001
Serial Number	05 B01		

Date:	Time:	Elapsed Time	Round Type	Number of Rounds:	TIR: If Applicable
14 Jun	14:30	21	TP	6	
14 Jun	14:35	19 sec	TP	6	
		avg 30 sec / 5 rds =		0.6 sec	
		~~cyclic~~ rate =		100 rds/min	
				~~2.5/min~~	
				2.5 sec.	

Ammunition Compatibility Test Data Card

date 6/14

Test Item Description	M360	Test Procedure Number	Tep 05 of 001
Serial Number	05 Box 2		

Date:	Time:	Condition:	Round Type	Number of Rounds:	TIR: If Applicable
6/14	1350	good	3HE 3 Smoke	6 rds	all functioned no issues
	1350	Bottom - Bull - Foam Rubber			
		Bottom - 3 HE	All Functioned no issues		

Attitude Firing Test Data Card

date_____

Test Item Description	MSGL	Test Procedure Number	Top 05 OF 001
Serial Number			

Date:	Time:	Condition:	Attitude	Number of Rounds:	TIR: If Applicable
6/14	14:00	good	Right up	1rd	
			Left up	1rd	
			Bottom up	1rd	
			Vertical Muzzle up	1rd	
			left up	3rds	
			right up	3rds	
			bottom up	3rds	
			Muzzle up	3rds	No Mal Functions
			Collapsed Stack	6rds	
					16rds
					22rds

PAGE ____ of ____

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Origination Date: 8 June 05

PROJECT OFFICER, Capt. John Douglas
Print Name/Rank
MarCorSysCom 432-3626
Unit / Organization **Phone #**

Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULTI-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: MGL-140
SERIAL NUMBER: 305003
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
080605/1400	NORTON	OTF	PROCESS	
15 Jan	LYONS	Range 15	Cold Test	

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

DUPLICATION AUTHORIZED

Test Data Card **date** 19 June 05

Drop Test	Time	Temp	Remarks
	1400	+198°F	Dropped Top up, checked clay Rotated cyl, upon on Fire
Top Up			
Top Down	1400	+148°F	Dropped Top Down, checked clay Rotated cyl, upon on Fire
Right Up	1400	+148	Dropped Right up, checked clay Rotated Cyl, upon on Fire
Left ~~Down~~ up Rad	1401	+146	Dropped Left up, checked clay Rotated cyl, upon on Fire
Muzzle Up	1401	+146°F	Dropped muzzle up, checked clay Rotated cyl, upon on Fire
Muzzle Down	1401	+145°F	Dropped muzzle Down, checked clay Rotated cyl, upon on Fire

Final Inspection:

Once all 6 axis had been Tested, The upon was Re cocked And Fired on All 6 cyl. All 6 clay Primers showed Good Firing Pin Strikes

Test Data Card date 6/28

Drop Test	Time	Temp	Remarks
Top Up	13:00	-28F	dropped top up rotated cyl.
Top Down	13:00	-28F	dropped top down rotated cyl. - damaged sight + pad grip
Right Up	13:00	-27F	dropped Right up rotated to next chamber
Left ~~Down~~ up RH	13:00	-27	dropped Left up rotate cyl.
Muzzle Up			dropped muzzle up shoulder stock retracted rotate cyl
Muzzle Down			dropped muzzle down rotate cyl. to step.
Final Inspection: opened cyl. no indication of primer impact. reset cylinder dry fire and advance each chamber. all 6 primers show good impact.			

Test Data Card date 15 June

Test Item Description	M50L	Test Procedure Number	
Test (Hold/Cold)	Cold Test		
Weapon Serial Number	05B02		
Configuration (wet/dry, extended/retracted)	dry - clean - unfired		
Preconditioned?	no		

Chamber Conditioned	Time	Temperature	
Test Article in Chamber	Time	Temperature	
0:00 0	0615	-34.5	
0:30			
1:00			
1:30			
2:00	0815	-34.7	
2:30			
3:00	0930	-26	
3:30			
4:00	1000	29.6	
~~4:30~~			
5:00			
5:30			
6:00			

Test Data Card date_____

Test Item Description	MSGL	Test Procedure Number	
Test (Hold/Cold)	Cold		
Weapon Serial Number	05 802		

Rounds Fired	Time	Temp	Remarks
1 6	1030	-28	slow to advance required
2 6	1035	-28	" manual advance
3 6	1040	-28	"
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Final Condition: Inspection showed, no issues			

Test Data Card date 30 Jan 05

opn 05B02 - 3 time for drop test. same opn.

Drop Test	Time	Temp	Remarks
Top Up	0900	74°F	Dropped rotate cyl.
Top Down			Dropped rotated cyl. Damaged sight no longer serviceable
Right Up			Dropped rotate cyl
Left ~~Down~~ UP			Dropped rotate cyl.
Muzzle Up			Dropped rotate cyl Damaged buttstock.
Muzzle Down			Dropped. checked primers all good. Dropped again on asphalt.

Final Inspection:

reset cyl. fired on all 6 chambers.
- primers show good impacts
- No safety issues, some damage to attachments

21 June 2005 1600

Start Salt/Fog for M5GL

Ran function check

Loaded Dummy Rounds

Documented Pre Test Condition with Pictures

---

22 June 2005 1600

Removed M5GL

Ran Function check

Dry Fired all Six Rounds

M5GL Functional

Documented with Pictures

---

23 June 2005 1600

Removed M5GL

Documented Condition with Pictures

Ran function check Trigger Has slight Sticking

---

30 June 2005

Found Gas Piston Corosion

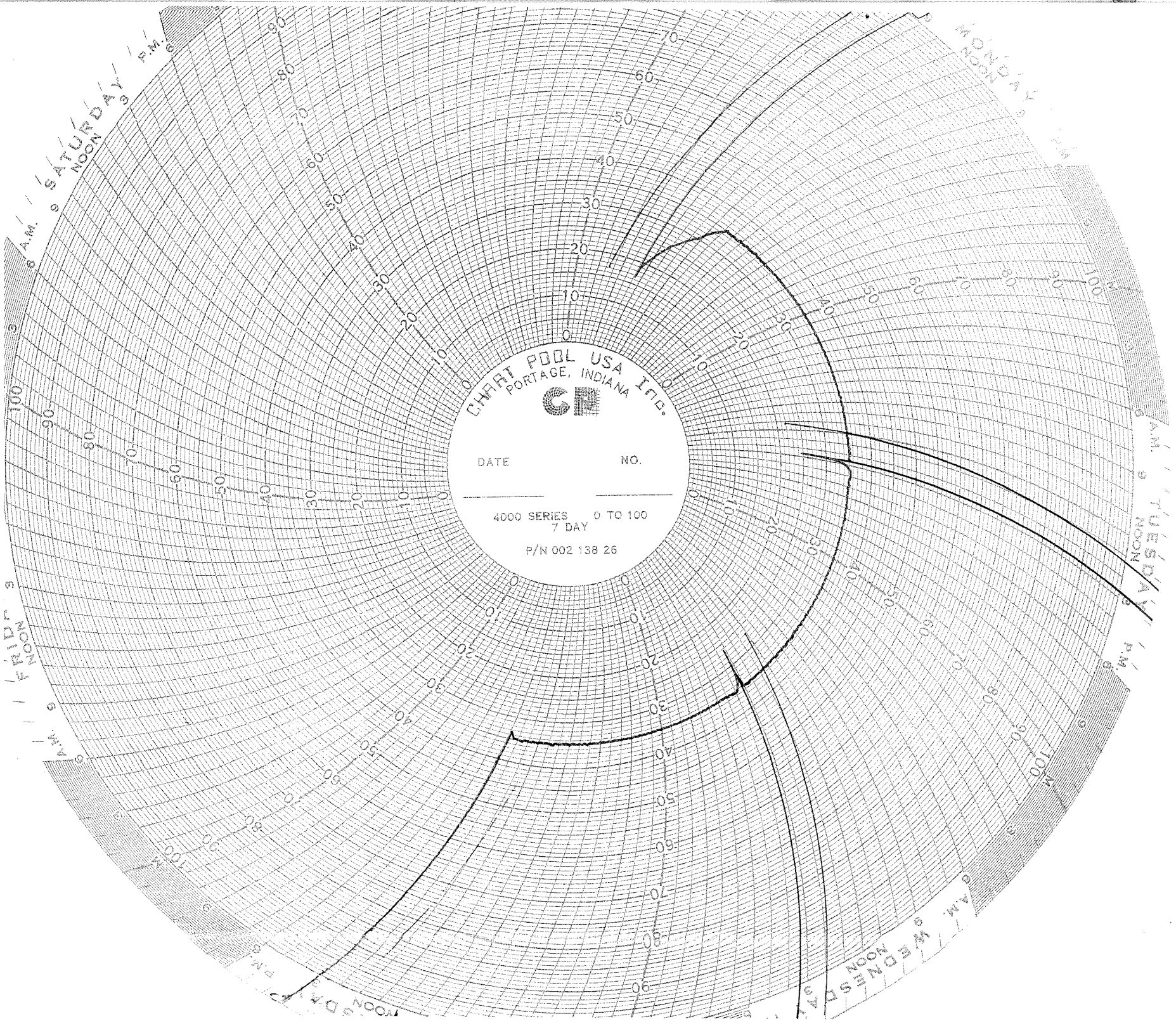
CHART POOL USA LTD.
PORTAGE, INDIANA
DATE
NO.
4000 SERIES 0 TO 100
7 DAY
P/N 002 138 26
SATURDAY
MONDAY
TUESDAY
WEDNESDAY
FRIDAY
NOON
A.M.
P.M.

UNITED STATES MARINE CORPS
MARINE CORPS SYSTEMS COMMAND
Ordnance Test Facility
Bldg. #2247 Willis St.
Quantico, VA 22134

TEST ARTICLE CUSTODY RECORD

Origination Date: 8 June 05

PROJECT OFFICER, Capt. John Douglas
Print Name/Rank
MarCorSysCom 432-3626
Unit / Organization **Phone #**

Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULTI-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: MGL-140
SERIAL NUMBER: 3050004
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
050605/1400	NORTON	OTF	PROCESS	
15Jun	LYONS	Range 15	function test	

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

DUPLICATION AUTHORIZED

0580S

6/15

Functional Free

0926 – Fire Ends TP

no issues noted.

UNITED STATES MARINE CORPS
MARINE CORPS SYSTEMS COMMAND
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TEST ARTICLE CUSTODY RECORD

Origination Date: 8 June 05

PROJECT OFFICER, Capt. John Douglas
Print Name/Rank
MarCorSysCom 432-3626
Unit / Organization **Phone #**

Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULTI-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: MGL-140
SERIAL NUMBER: 305005
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
08 Dec 05/1400	NORTON	OTF	PROCESS	
09/15/05	LYONS	Range 15	function ✓	

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

DUPLICATION AUTHORIZED

.05 B 04 6/15/05

Functional Testing

~~7~~8 rds TP

no issues noted.

UNITED STATES MARINE CORPS
MARINE CORPS SYSTEMS COMMAND
Ordnance Test Facility
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Quantico, VA 22134

TEST ARTICLE CUSTODY RECORD

Origination Date: 8 June 05

PROJECT OFFICER, Capt. John Douglas
Print Name/Rank
MarCorSysCom — 432-3626
Unit / Organization — **Phone #**

Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULTI-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: ML-140
SERIAL NUMBER: 305007
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
08/06/05/1400	NORTON	OTF	PROCESS	
06/15/05	CYONS	Range 15	function ✓	

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

05 BOS 6/15/05

Function Check

Fire Cards TP.

no issues noted.

Appendix B: LUE Results

The MSGL Limited User Evaluation was conducted at MCB Quantico Range 5 on 22 June 2005. Thirteen Marines from Instructor Battalion, The Basic School, participated in the evaluation as a T/O rifle squad. Of the thirteen Marines, one was a sergeant, seven were corporals, and five were lance corporals. All were 0311s with an average time in service of 4.5 years, and most had combat experience in the GWOT.

The course of fire consisted of a new equipment training session, safety brief, familiarization fire, qualification course, convoy live fire, daytime attacks, and nighttime attacks. Over the course of fire, over 750 rounds of 40mm ammunition of various types were expended, with the average Marine firing over 50 rounds.

Overall, feedback was very positive on the system. On the post-evaluation surveys, the average response on the weapon effectiveness scale (1-7, with 1 being completely ineffective and 7 being completely effective) was 5.98. The general consensus was that the system was accurate, lethal, comfortable, compact, and easy to operate. The concerns that were voiced included issues such as back-up sights, difficulty sighting at longer ranges with the occluded eye-type gunsight, difficulty in making windage and elevation adjustments, reloading on the move or in combined spaces, and the provision for a back-up weapon.

LUE Qualification Scores

Station 1: Two bunker targets (one 100m, one 125m) = 3 rounds
Station 2: Two bunker targets (one 150m, one 175m) = 3 rounds
Station 3: Two clusters of troop silhouettes in open (one 250m, one 350m) = 3 rounds
Total possible hits = 9

Shooter	Station 1	Station 2	Station 3	Total
1	3	2	1	**6**
2	3	1	1	**5**
3	1	2	1	**4**
4	0	2	2	**4**
5	3	2	1	**6**
6	3	0	1	**4**
7	1	1	1	**3**
8	3	3	1	**7**
9	2	2	1	**5**
10	3	2	1	**6**
11	1	2	1	**4**
12	2	3	1	**6**
13	3	2	1	**6**

Average 100m-125m = 2.15 (72%)
Average 150m-175m = 1.85 (62%)
Average =250m-350m = 1.08 (36%)
Overall Average = 5.08 (56%)

**Comparable M203 scores not available for this squad. According to FM 3-22-31 *40mm Grenade Launcher M203*, passing qualification score is 33%. All Marines in this squad passed the qualification with the MSGL.

24 June 2005

MSGL LUE User Questionnaire Responses

When: 22 June 2005 at Range 5, MCB Quantico
Who: a 13-man rifle squad from E&I Co., TBS
Shooter Info:

Rank	LCPL	CPL	Sgt
	5	7	1
MOS	0311	0311	0311
Yrs in USMC	2-3	4	5 -6
	3	5	5

Question 1. Rate your ability to achieve a good sight picture.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					4	6	3	*5.92*

Comments.
User 2 – there should be a secondary aiming sight.
User 3 – fairly easy once we got used to keeping both eyes open.
User 4 – targets beyond 275 yds harder to sight in on, overall still able to get effects on target.
User 5 – 250 meters and out need to have a different sight.
User 9 – long distances it is hard because sight is pointed at barrel, if sight was canted to one side or the other would be better.
User 11 – don't really have a good reference to line up with.
User 12 – using scope at long ranges takes some getting used to.
User 13 – barrel mass was a problem for 250 meters and out.

Question 2. Rate your ability to achieve satisfactory eye relief.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					2	3	8	*6.46*

Comments.
User 2 – collapsible buttstock is a good idea since all Marines body structures is different.
User 3 – the telescopic buttstock makes eye relief almost a non-factor.
User 4 – still able to keep alert with both eyes and get a good sight picture is nice.
User 9 – took a little bit to get it, it was harder at longer distances because of the sight pointing at the barrel.

Question 3. Rate your ability to achieve satisfactory stock weld.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses		1	1	1	1	5	4	***5.54***

Comments.
User 2 – with more training, this will come naturally.
User 3 – stock weld was easy to achieve because of the clean & simple design of the system.
User 9 – I really liked how you are able to cant barrel up or down, it helps out with stock weld.
User 10 – due to changing range apparatus, stock weld was difficult to maintain constant.
User – 13 – stock weld was only achieved between 0-100 meters.

Question 4. Rate your ability to zero the weapon.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses			1	2	3	4	3	***5.46***

Comments.
User 2 – weapon sight was maxed out and I still had to aim low and to the right.
User 3 – zeroing was simple, only problem is the scope needs to have a wider angle of adjustment.
User 4 – extremely accurate zero, and easy to achieve.
User 5 – weapon was firing high and to the left.
User 9 – the sight was moved all the way yet I still had to aim way low of the target.
User 10 – more adjustment room is needed.
User 11 - should have a way to adjust sight as can in M16A2.
User 12 – shoots to high.

Question 5. Rate your ability to adjust the sights for windage.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses	1	1	1	3	2	1	1	***4.1***

Comments.
User 2 – maxed out all the way to the right and was still off.
User 3 – same as #4, the sights need to have a wider angle of adjustment.
User 4 – hard to do without a tool or someone to help, needs knobs instead of screws.
User 5 – tool required for sight adjustment needs to be part of SL3 gear.
User 7 – did not adjust for windage, needs and adjustment tool, does prohibit windage adjustment while on the move.
User 8 – I did not adjust the sights, try to adjust without tool so you can adjusts on the move.
User 9 – need to make sights were I don't need a tool to make adjustments.
User 10 – could not adjust enough.
User 11 – same as above. (should have a way to adjust sights as can in M16A2).

Question 6. Rate your ability to adjust the sights for elevation.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses	1			1	2	2	5	***5.64***

Comments.
User 2 – its better to Kentucky windage than to adjust.
User 3 – again the clean design and the simplicity of elevation on sights were very user friendly.
User 9 – need to make sights were I don't need a tool to make adjustments.
User 10 – could not adjust enough.

Question 7. Rate the weapon's effectiveness throughout the various combat shooting positions (standing/kneeling/prone).

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses						5	8	***6.62***

Comments.
User 2 – not so great on the prone position, but we might need more practice.
User 3 – the ease of transition from one firing position to the next was greatly increased by being able to adjust the angle of the buttstock and the compact design of the system.
User 4 – able to achieve good sight picture and stability with each position.
User 9 – was very effective and accurate after getting BZO.
User 10 – once I figured out where the round would impact, I was "steel on steel"
User 13 – I was able to put rounds within killing radius without a problem.

Question 8. Rate your ability to engage stationary targets.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses				1		1	11	***6.69***

Comments.
User 2 – weapon is very accurate.
User 3 – the sighting scope made stationary target engagement an almost point and shoot system.
User 4 – with the proper range set, its extremely easy.
User 9 – very accurate sight makes it easy to make adjustments from last shot impact.
User 11 – will get a little heavy and wobbly.

Question 9. Rate your ability to engage targets using supported shooting positions.

Completely Ineffective — Completely Effective — *Avg.*

Score	1	2	3	4	5	6	7	
Responses						3	10	*6.77*

Comments.
User 2 – more stability = better shooting.
User 3 – again the adaptability of the weapon to change stock length, angle and the position of the front hand grip made using a supported position comfortable and practical.
User 4 – extremely easy and comfortable.
User 9 – very accurate.

Question 10. Rate your ability to quickly present your weapon and engage targets.

Completely Ineffective — Completely Effective — *Avg.*

Score	1	2	3	4	5	6	7	
Responses					1	7	5	*6.31*

Comments.
User 2 – when fully loaded the weapon is heavy and it takes a little muscle to put on target.
User 3 – it's a pretty straight forward system.
User 4 - easier than the M16.
User 9 – very nice but need a little practice to get use to sights.
User 11 – there should be a way to keep the radical on tgt all the time, that way you don't have to stop and push the button if under fire.

Question 11. Taking all factors into consideration, rate weapon suitability for engaging targets at known distances.

Completely Ineffective — Completely Effective — *Avg.*

Score	1	2	3	4	5	6	7	
Responses					1	3	9	*6.62*

Comments.
User 2 – sights are generally accurate on distance.
User 3 – the sights easy readability & adjustability made engaging KD targets very accurate and quick.
User 4 – accurate weapon once zeroed.
User 9 – sights were very accurate, easy to engage point targets.
User 10 – need to better adjust elevation & windage, used consistency "Kentucky windage".
User 13 – buttstock has slight vertical movement.

Question 12. Rate your ability to conduct fire and movement with the weapon during daytime attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses				1	1		1	5.33

Comments.
User 7 – reloading in prone position presented problem for being able to reengage targets rapidly.
User 13 – reloading is a problem due to casings getting stuck in the cylinder.

Question 13. Taking all factors into consideration, rate the weapon's suitability for engaging targets at unknown distances during daytime squad attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses						2	1	*6.33*

Comments.
User 7 – reloading takes time while in the prone.
User 13 – buttstock has slight vertical movement.

Question 14. Rate your ability to conduct fire and movement with the weapon during nighttime attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses						1	1	*6.5*

Comments.
User 5 – sights help but reloading and re-cocking is difficult.
User 8 – little hard reload but in time will be good.

Question 15. Taking all factors into consideration, rate weapon suitability for engaging targets at unknown distances during nighttime squad attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					1		1	*6.00*

Comments.
User 5 – hard to gage distance at first, but more training will help.

Question 16. Rate your ability to engage targets while riding on vehicle port side.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					2	6	5	***6.23***

Comments.

User 2 – trigger can be operated easy, size of the weapon is excellent inside vehicles, but hard to be accurate from weak shooting side.

User 3 – the compact design of the system made it easy to maneuver & reload in the confines of a vehicle.

User 4 – easier to shoot and reload being a right handed shooter.

User 9 – ability is a little easier then M16/203 because of the shortness of the weapon.

User 10 – good for right handed shooters.

Question 17. Rate your ability to engage targets while riding on vehicle starboard side.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses			1	1	2	4	5	***5.85***

Comments.

User 2 – easy to reload due to the size of weapon, can maneuver the weapon in small places.

User 3 - the compact design of the system made it easy to maneuver & reload in the confines of a vehicle.

User 4 – not easy to reload being right handed.

User 9 – little harder because left handed.

User 10 – had to be perpendicular to general target direction.

Question 18. Taking all factors into consideration, rate weapon suitability for engaging targets from inside a moving vehicle.

Completely Ineffective							Completely Effective	*Avg.*
Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses				1	2	7	3	*5.92*

Comments.

User 1 – need to find a quicker to help the shooter to spin the breach.
User 2 – hard to find a sight picture but great to suppress.
User 3 - the compact design of the system made it easy to maneuver & reload in the confines of a vehicle.
User 4 – very doable. Awkward at times, but you can engage targets.
User 7 – need of a drop pouch for extra rounds. Cramped conditions do make it difficult.
User 8 – it is good shooting from a vehicle, if you are suppressing an area for example, if you get ambushed you can suppress the area real quick.
User 9 – easy to get up and present to target because of the short barrel.
User 10 – accuracy is somewhat compromised, but is good for covering fire while leaving or going through an ambush site.
User 11 – Bouncy, would be difficult to hit a point target if necessary.

Question 19. FOR LEFT HANDED SHOOTERS ONLY: Rate the weapon's design for left-handed shooters.

Completely Ineffective							Completely Effective	*Avg.*
Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses					2	1		*5.33*

Comments.

User 3 – it seems to be an ambidextrous system though if the breach would open to both sides it would make it easier for left-handed shooters.
User 7 – reloading left-handed needs adequate practice time.
User 9 – shooting and aiming were fine but unloading and loading were difficult, need to make breach swing either way.

20. Please list any safety issues you could foresee.

User 2 – keep in mind the angle of the barrel when shooting, especially from a window. You don't want to hit the ledge because the barrel was not or had enough clearance.
User 3 – from my experience the system seemed very safe.
User 6 – misfire procedures.
User 9 – misfire procedures if a Marine has a hang fire and then just roles past round it could explode in his face. My solution: make sure Marines are well informed of the safety features of the weapon.
User 10 – could not think of any at this time.

(Question 20 continued)

User 11 – Speed on reloading, should be/have something that would speed up the reloading process. The sling looks like it would pop out and fall off at any given time, could be bad if sling on back while moving. The buttstock is wobbly, could break. The safety is a little hard to manipulate.

User 13 – I could not see any safety issues due to weapon career.

21. Please list any other problems you could foresee with the system or its employment.

User 2 – time to reload, awkward to carry, very bulky, battery life on the sight (no batteries).

User 4 – before you can shoot you must cock the revolving chamber which is awkward. Having a knob like those used on steering wheels to get a good turn would be great. If the batteries go down on the sight there is no alternative sight.

User 5 – what secondary weapon will you put with this weapon?

User 6 – need an alternate sight in case the electric sight goes down.

User 7 – need a secondary weapon. Ranges of 250 meters plus presents problem of barrel mass for sight.

User 8 – a way to do some type of quick reload without having to de-cock, then re-spin, load and get back into the fight. For example, you fire 3 rounds and you get a chance to reload.

User 9 – left handed shooters will have hard time with reloading, should make the breach swing either way. Need to have another way to aim weapon if the batteries in the sight dies.

User 10 – when zeroing and BZO more adjustment room is needed, alternate or secondary weapon needed.

User 11 – heavy: cut down the weight. Reloading process needs to be faster. Secondary weapon: what is it? Alternate sight: should have another incase the battery goes down.

User 13 – the barrel gets in way of the sight at 275 meters and out. Winding cylinder could become difficult when fine motor skills are gone in combat situations. A full size rifle (M16) could become difficult to utilize when carrying this weapon. Spent casings get stuck in cylinder even after utilizing extractor bushing. Numbers on cylinders should glow for night time operations.

22. Additional Comments.

User 1 – if this is going to be the prime weapon, what is going to be the secondary weapon?

User 2 – secondary sight, back-up weapon?

User 5 – Sights: need to have an adapter on the rail system for a quadrant sight in case the primary optic battery dies.
Reload: half moon clips could help with quick reload & re-cocking the weapon.

User 7 – weapon performs well, with time & practice can be employed with devastating effects.

User 8 – secondary sights, other than that with some more trigger time this will be a very effective weapon in a combat environment.

User 10 – "iron sights", or alternate means of accurately engaging threats if battery fails. Offset sights for easier target acquisition. Will be an important asset in a combat zone.

User 11 – think with more time on the weapon and more PMEs weapon will be very effective.

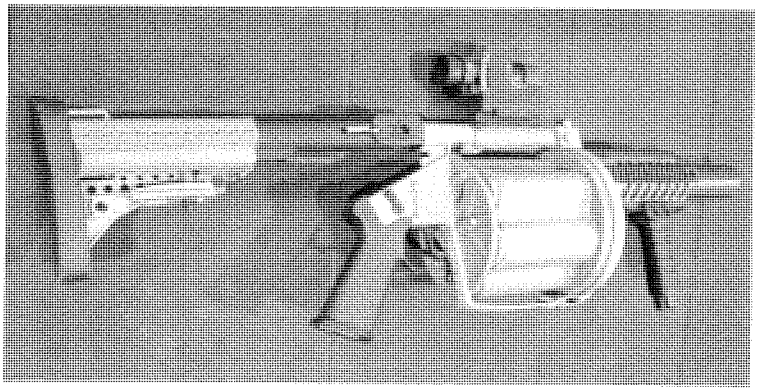
User 12 – there should be some kind of winding handle instead of putting your fingers in the barrel.

User 13 – overall great weapon to fire and I was confident in firing.

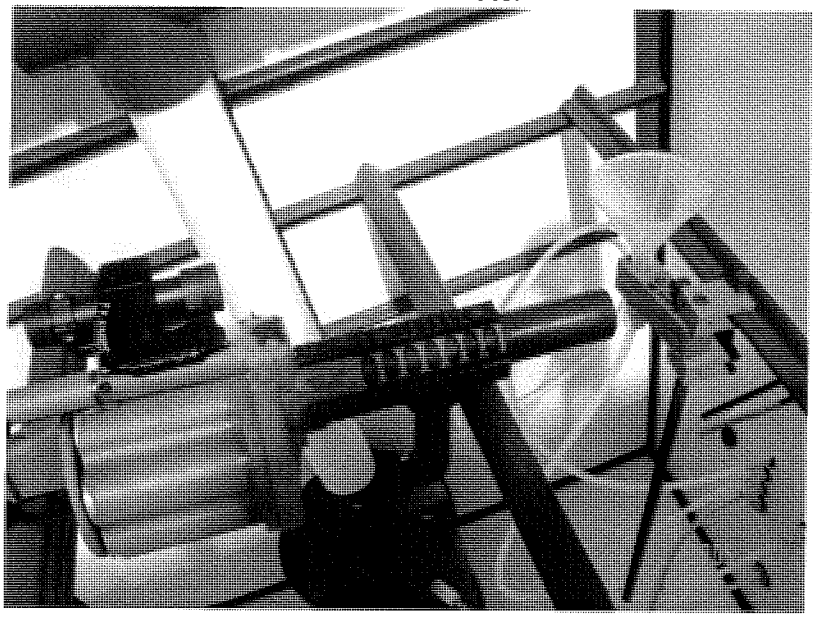
(7) At the end of 48 hours, remove the MSGL and inspect for damage or material deterioration.
(8) Functional test each MSGL. Record results.
(9) Repeat this test if time permits.

5.2.4.2 Test Result:

Test Article 05B01 was cleaned lubricated then shot approximately 100 rounds prior to testing.

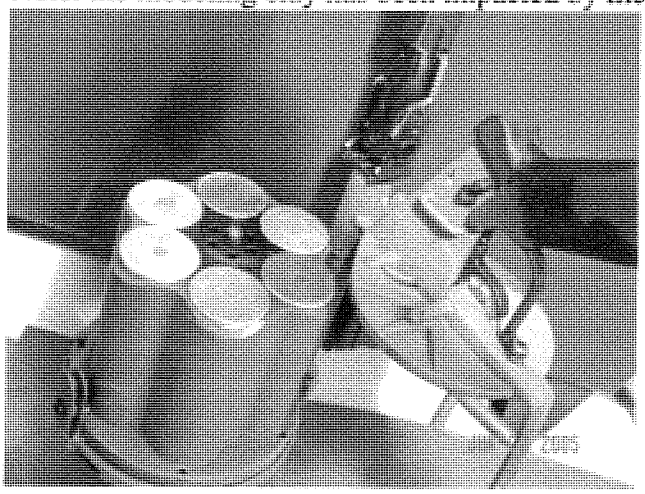


Placed into the environmental chamber.

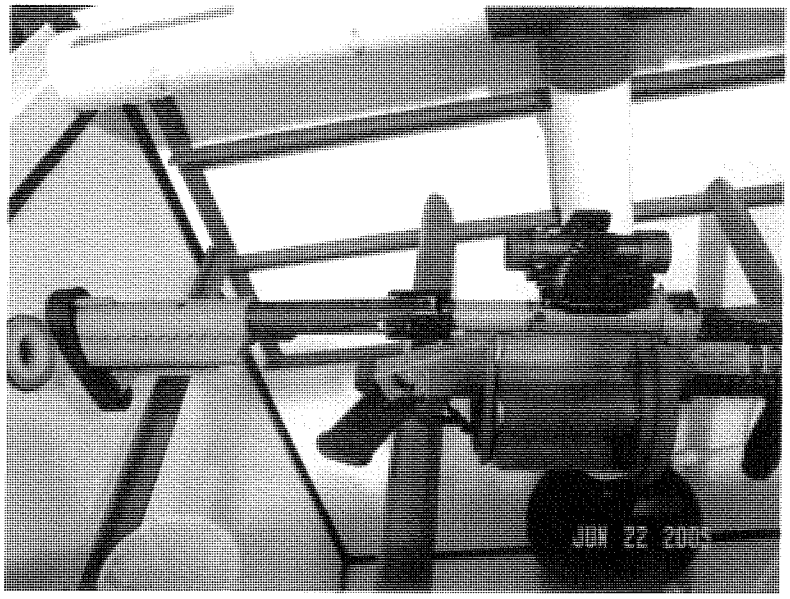


At 24 hrs the test article was removed and inspected. Dry fired 6 rounds. Below are dummy rounds prior to testing and after function test.

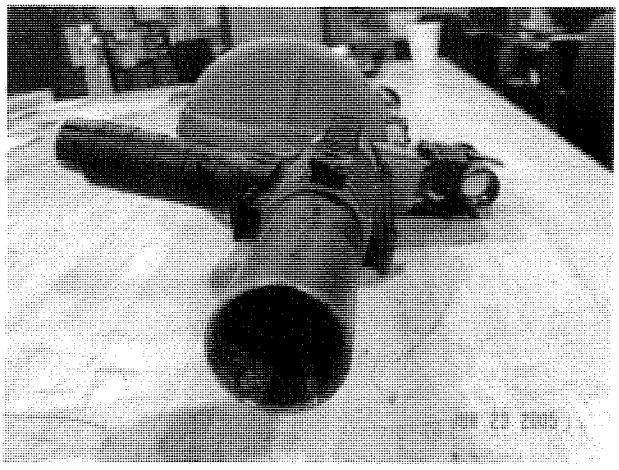
Note: the modeling clay has been impacted by the firing pin after function check.

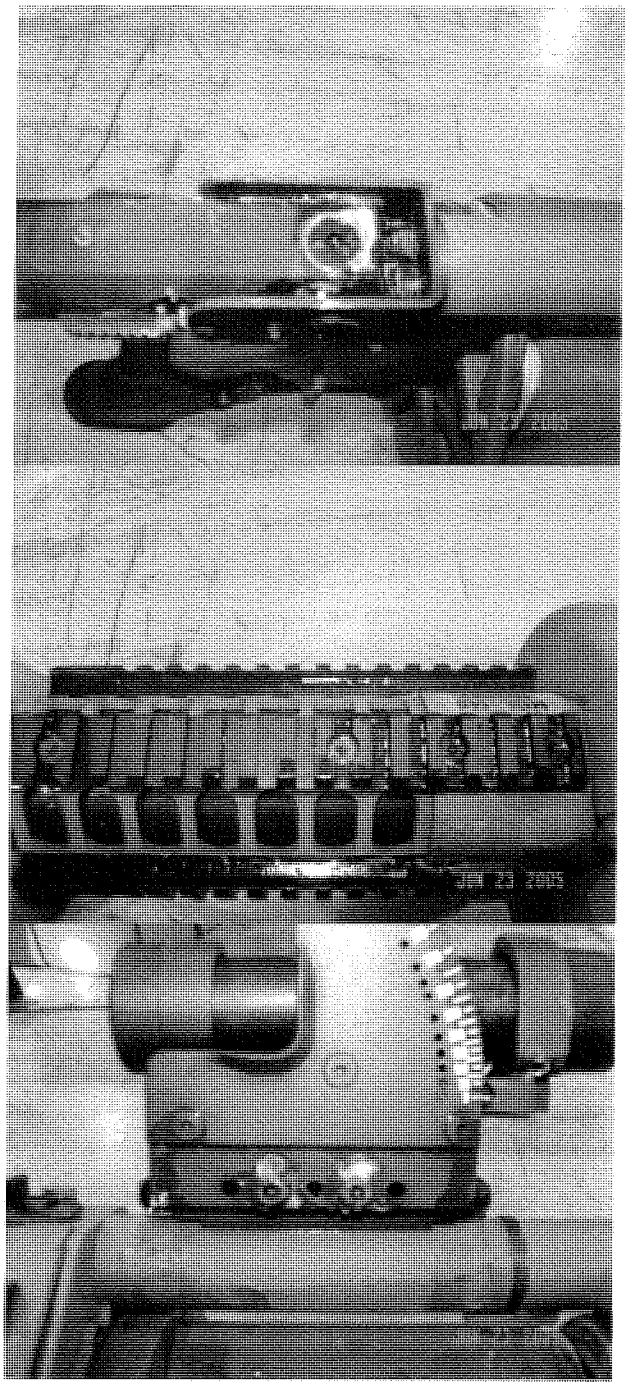


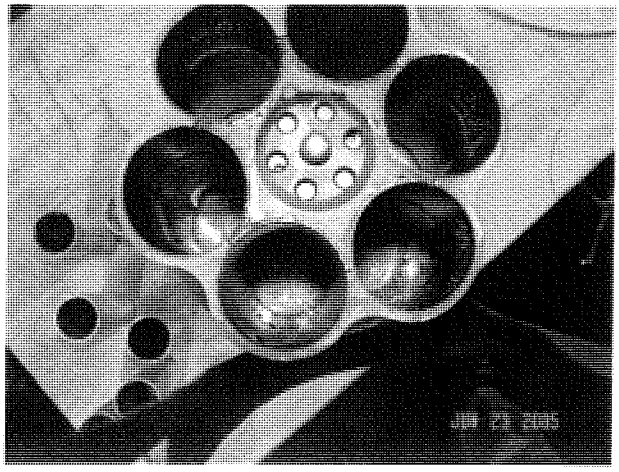
After inspection the test article was returned to the chamber for 24 hrs.

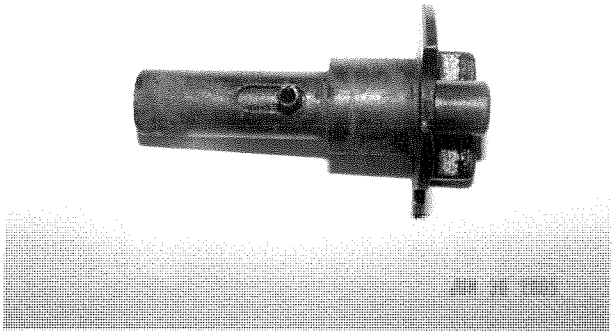


The test article was removed after 24 hrs. Then inspected for damage or material deterioration.









Despite the corrosion noted above the weapon still functioned

This weapon completed salt/fog in 5% salt-water solution with minor corrosion. There was no evidence of finish loss and no pitting.

The weapon functioned normally when removed from the chamber. All 6 primers were struck and the weapon manually advanced as normal.

Visible signs of oxidation evidenced minor corrosion. At no instance did corrosion cause malfunctions or unsafe conditions. Corrosion on the gas piston may cause a failure to advance but would not cause an unsafe condition. Trigger operation was rough but functional after weapon was allowed to dry.

5.2.5 Sand & Dust Test

Dust testing was conducted to evaluate if the MSGL can be stored and operated in a high dust environmental condition without degrading performance, effectiveness, reliability, and maintainability clogging effects of particles. Dust testing was conducted to evaluate the ability of the test article to resist the effects of dust that may obstruct openings or penetrate into cracks and joints.

5.2.5.1 Evaluation Procedure

The following procedure was conducted for this test:

(1) Create a dust mixture by mixing the materials by weight percentage to be consistent with the MIL-STD-810F silica dust.
(2) Clean and lubricate the MSGL, then live fire the MSGL a minimum of 6 rounds, to establish a normal operating mode. Do not clean or lubricate after operation.
(3) Place the MSGL in the conditioning chamber.
(4) MSGL unloaded and in carry configuration.
(5) MSGL loaded with inert rounds. Safety selector on.
(6) Condition the MSGL for a minimum of 48 hrs – by maintaining an average dust concentration consistent with the MIL-STD-810F dust concentration for blowing dust. Dust concentration average was 10.6g per cubic meter over the 48 hr period.
(7) Remove the MSGL from the chamber and wipe clean with bare hands.
(8) Attempt to operate the MSGL.
(9) Inspect the MSGL for damage or material deterioration.

5.2.5.2 Test Results:

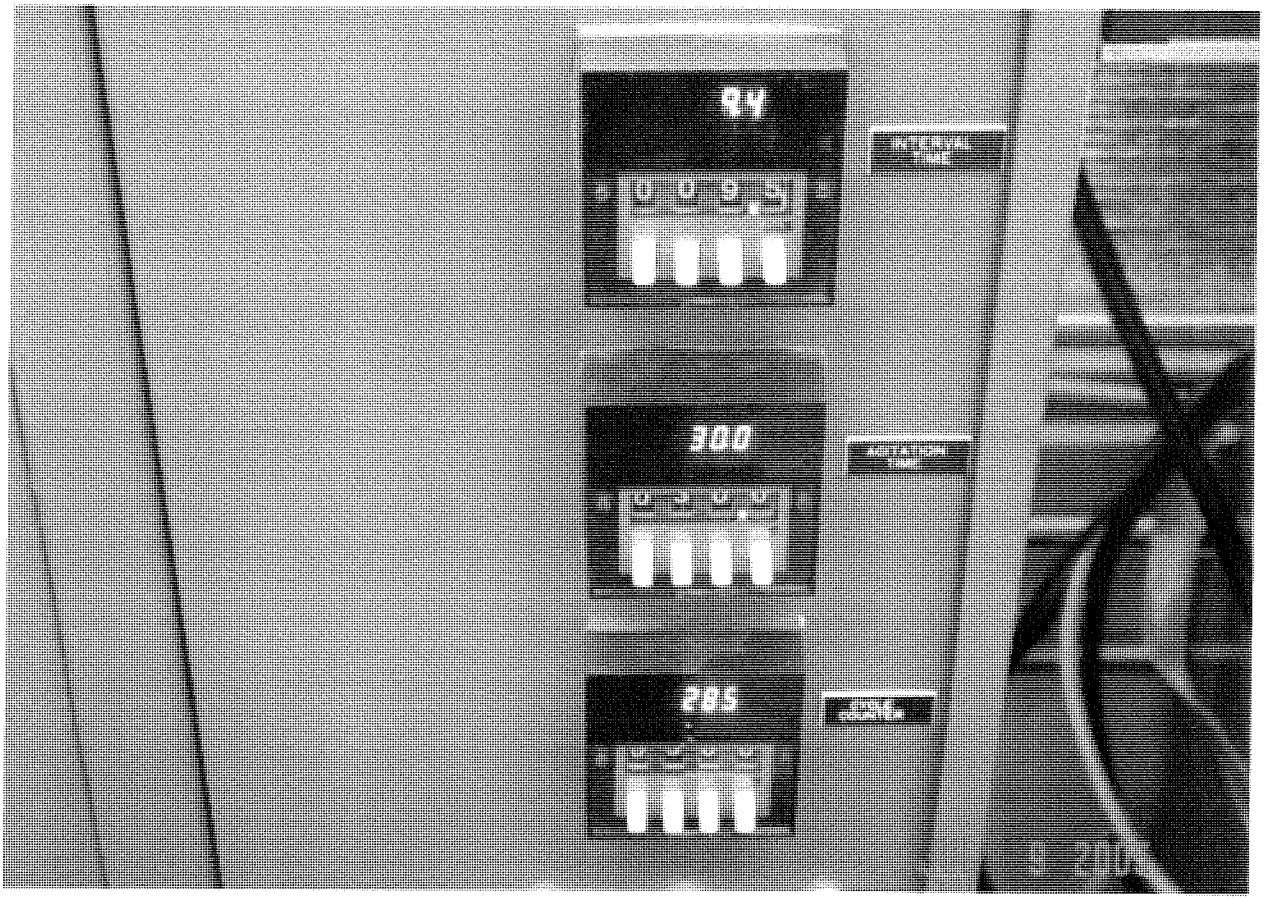
Verified function of weapon prior to conditioning.

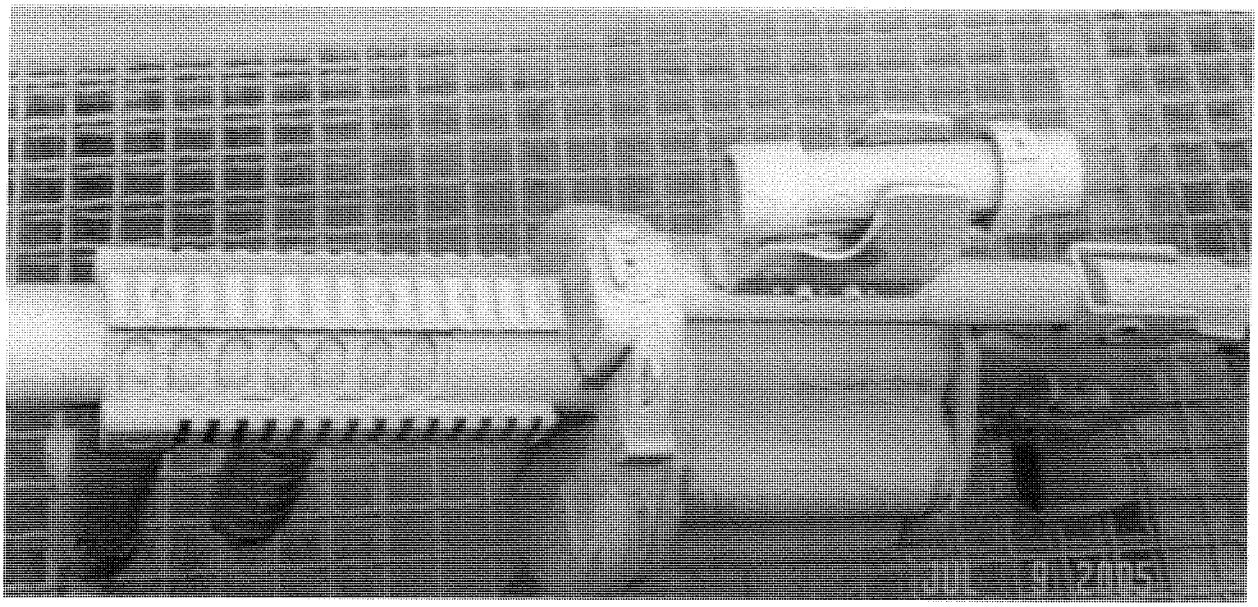
Weapon was conditioned for a total of 48 hrs.

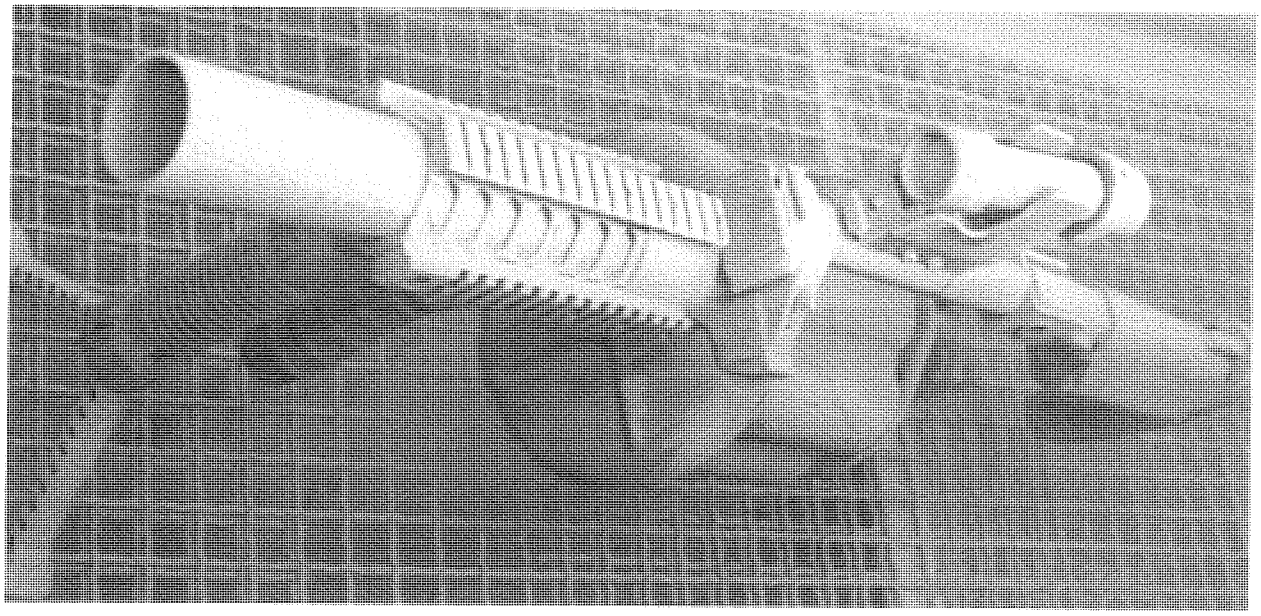
Weapon functioned normally when dry fire was attempted.

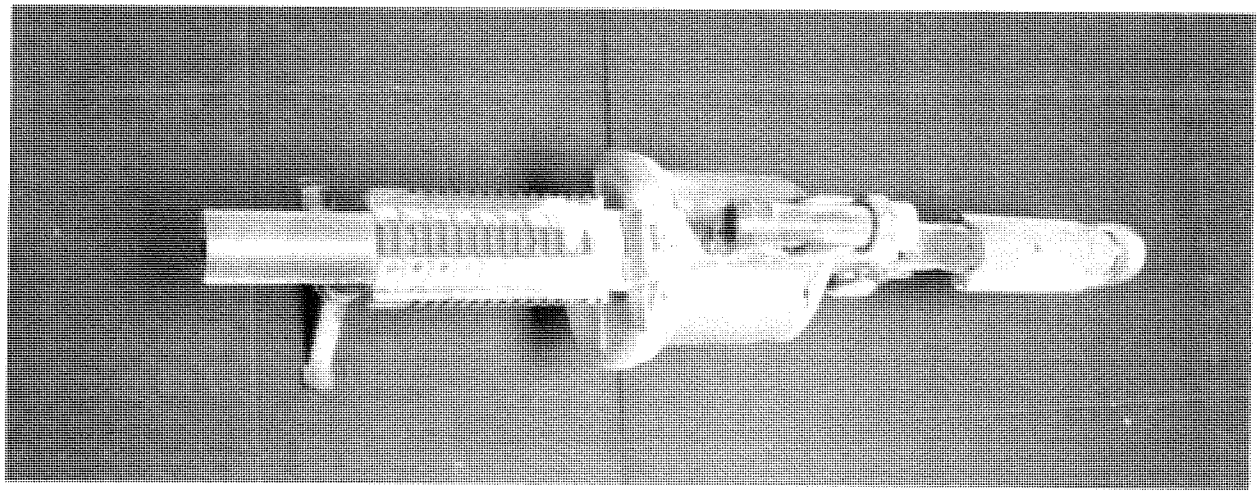
Shows good primer strike on all 6 attempts.

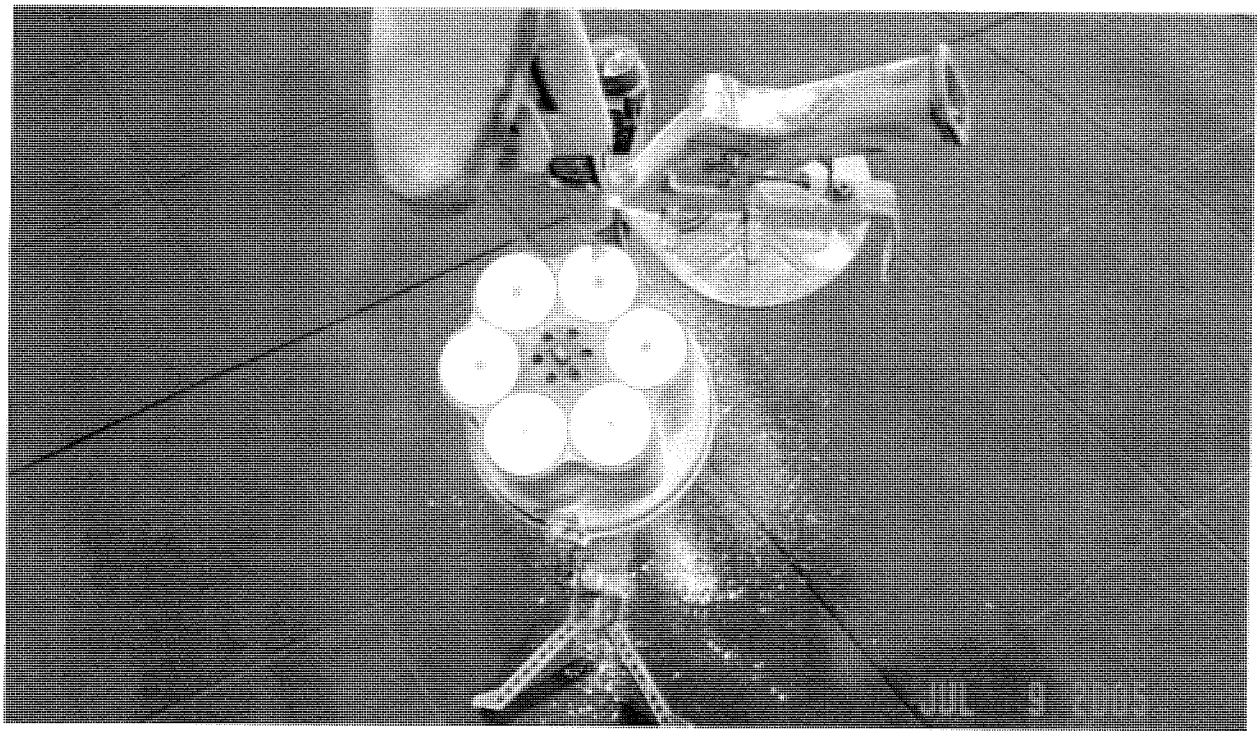
There were no issues noted.


94
300
285









5.2.6 Mud Test (Wet & Dry)

Mud testing was conducted to determine if the rifle performs safely when exposed to a mud environment.

5.2.6.1 Evaluation Method

The following procedure was conducted for this test:

(1) Create a mud mixture by mixing 10 lb of montmorillonite clay, 2 lb of silica sand, and 48 quarts of water together.
(2) Clean and lubricate the MSGL, then live fired the MSGL a minimum of 6 times, to establish an "outside of its shipping/ storage container and set up in its normal operating mode". Do not clean or lubricate after operation.
(3) Covered muzzle.
(4) Placed the weapon horizontally into the prepared mud mixture.
(5) The weapon loaded with inert rounds, and the safety in the "on" position.
(6) Immerse the weapon for 60 seconds. Agitate weapon in mixture.
(7) After immersion, wiped the weapon with a bare hand – crudely cleaning the weapon.
(8) Attempt to "fire" at 6 inert rounds with the weapon.
(9) Repeated steps b through g of this test, except this time allow the weapon and ammunition to dry for a minimum of four hours before continuing to step f.

5.2.6.2 Test Result:

Wet Mud, 30 June 2005

Weapon 05B02 was checked to determine if it was serviceable.

Loaded with 6 dummy rounds, clay filled primers.

Weapon was immersed in mud and agitated for 60 seconds.

Weapon was removed from mud, excess mud was removed using a wiping motion with a bare hand.

Attempted to override safety on several occasions. Was not able to override the safety.

Weapon was dry fired. There were no instances where the safety could be overridden.

There were positive primer impacts as indicated by the clay on all chambers.

Dry Mud

Weapon was cleaned and dummy rounds with clay primers were inserted.

Weapon was immersed in mud and agitated for 60 seconds.

Weapon was removed from mud, excess mud was removed using a wiping motion with a bare hand.

Weapon was allowed to dry for 4 hours.

There were no instances where we were able to override the safety.

Weapon was slow to advance and required assistance on several chambers.

Trigger required 2 attempts on several chambers to fire, but fired with good impact on 2 attempts. There appears to have been debris in cylinder alignment recess which required double trigger tap to clear.

There were good primer impacts indicated by the clay on all chambers.

Following fresh water rinse, the weapon functioned normally.

There were no unsafe conditions observed during testing.

5.3 TARGETING AND ACCURACY

Accuracy of the MSGL was tested to verify it is as good or better than the accuracy requirement of the M203 Grenade Launcher.

The accuracy requirement of the M203 Grenade Launcher is described in Section 3.3.3.2 of FM 3-22.31 which is included as Reference 5.

Summarized: the requirement is that the MSGL will be capable of hitting a rectangle target that measures 36.6 meters in range and 6.38 meters in deflection from a distance of 200 meters.

5.3.1 Evaluation Procedure:

The accuracy was verified using the FM 3-22.31 40mm Grenade Launcher M203 Section 5-10 Overall Qualification Standards, 40mm Grenade Launcher Scorecard DA Form 2946-R, for each shooter, shooting each MSGL being tested.

The following procedure was followed.

Verify the MSGL is serviceable and ready to fire.
Shooter #1 will fire the qualification course using the MSGL, Record results and score.

Repeat until Shooter #1 has fired the course with each MSGL being considered. Repeat for a minimum of three shooters.

5.3.2 Test Results:

Targeting evaluation was completed as a part of the Limited User Test. Complete data will be presented in the LUT report Appendix C.

Summary of results is as follows:

A total of 13 shooters.

Possible score or 9 hits over the course of fire.

Average score of 56% hits and the lowest being 36%, minimum for qualification per FM 3-22.31 is 33%. Each of the 13 shooters would qualify based on training standard for the M203.

5.4 RATE OF FIRE

Rate of fire was demonstrated using training rounds. The shooter fired a full magazine/ cylinder as quickly as possible while aiming at an area target. Total time will be recorded from the first round fired to the last round fired and the total time will be divided by the number of rounds fired not counting the first round fired (if 6 rounds are fired, divide time by 5 to get average time).

5.4.1 Evaluation Procedure:

The following procedure was conducted for this:

(1) Verify the MSGL is serviceable and ready to fire.
(2) Load MSGL with a full load of TP rounds.
(3) Aim the MSGL at a suitable target, awaiting command to fire from the test director/monitor.
(4) Monitor gives the command to fire and record time.
(5) Record time, recorded incidents/malfunctions or misfires.
(6) Repeated test.

5.4.2 Test Results:

MODEL: MILKOR MGL 140
Ser # 05B01
Shooter: Bill Norton
Ambient Temp: 95 degF
Attempt 1 - 6 rounds – 2.1 seconds
Attempt 2 – 6 rounds – 1.9 seconds

Average Time for each shot rd, 0.4 sec,

Maximum rate of fire 150 rds per minute or 2.5 rds per sec.

5.5 AMMUNITION COMPATIBILITY

The MSGL was tested to demonstrate the ability to fire a mix of ammunition types in the same magazine/ cylinder load. Three scenarios will be tested.

5.5.1 Evaluation Procedure

The following ammunition procedure was followed.

(1) Verified the MSGL was serviceable and ready to fire.
(2) Loaded MSGL with a full magazine/ cylinder consisting of a mix of rounds from the ammunition list.
(3) Aimed the MSGL at a suitable target; awaiting command to fire from test director/monitor.
(4) Monitor prepared to record information and give the command to fire.
(5) Repeated until all DODICS are fired or attempted to be fired.
(6) Recorded no incidents/malfunctions or misfires.

5.5.2 Test Results:

Weapon 05B01 was used for ammo compatibility testing.

1st load. – 3 HE & 3 smoke marker. – no malfunctions.
2nd load – non-lethal – 3 rubber ball – 3 rubber baton. – no malfunctions
3rd load – 3 illum – 3 HEDP – no malfunctions.

There were no malfunctions during compatibility testing.

5.6 ATTITUDE AND FEEDING TEST:

The MSGL was tested to verify reliable feeding when fired in top-up, top-down, right side up, left side up, vertical muzzle up, and vertical muzzle down.

5.6.1 Evaluation Procedure:

The following procedure was conducted for each of the test weapons.

(1) Functional Check of MSGL.

(2) Load MSGL with one full magazine/ cylinder of DODIC B519 and fired in each of the following orientations.
   a. Top-up

b. Top-down
c. Right-side up
d. Left side up
e. Muzzle up within 10 deg of vertical

(3) Recorded any malfunctions.

5.6.2 Test Results

Weapon ser # 05B01

Fired in 5 orientations plus w/ collapsed stock in the following sequence.

Right side up – 1 rd
Left side up - 1 rd
Bottom up – 1 rd
Vertical Muzzle up – 1 rd
Left up – 3 rd
Right up – 3 rd
Bottom up – 3 rd
Muzzle up – 3 rd

Collapsed Stock 6 rd

Total 22 rds

No malfunctions Occurred

5.7 RELIABILITY

The MSGL was evaluated to determine reliability.

5.7.1 Evaluation Procedure

The following procedure was used for reliability testing.

(1) Evaluate live firing to date and determine number of rounds fired by each MSGL and the remaining number of rounds for each ammunition type to reach minimum allowable for each DODIC.
(2) Fire the table of ammunition to verify proper functioning of each ammunition type. At a minimum each type will be fired from each shooting position and the MSGL shall be fired in multiple orientations to verify the MSGL is not susceptible to malfunction do to orientation or shooting position.
(3) In the event there is a misfire or failure of the round to function the minimum number of rounds for the DODIC or ammunition type will be increased to 100 rounds if ammunition is available. For planning purposes the DODIC B546 will be tested to a

minimum of 300 rounds due to the sensitivity of the rounds and the critical need for reliable function.

(4) Repeat as necessary to determine the cause of the malfunction or to develop a large enough samples to be able to judge the reliability with a confidence level of 90%.

5.7.2 Test Results

Weapon ser # 05B01

Training –	B519 – 100ea
HEDP –	B546 – 310 ea
Flair –	B535 – 23 ea
Smoke –	B509 – 20 ea
CS teargas –	B567 – 20 ea
Multiple Proj	B534 – 5 ea

Total 478 rds

During the course of fire 14 –15 June there were no misfires and a total of 3 rounds that failed to detonate. The rounds that failed to detonate were fired into a softened area and cause can not be determined.

5.8 POST-TEST INSPECTIONS

Upon completion of all preliminary evaluation tests, and again after all performance and reliability tests, a post-test inspection was performed.

5.8.1 Evaluation Procedure

The following procedure was conducted for this test:

(1) Disassemble the test MSGL and visually examine all major components.

(2) Conduct a NDI inspection of components as required.

5.8.2 Test Results

Visual inspection showed no degradation with the exception of damaged resulting from drop testing as previously noted.

There were no safety concerns noted throughout testing and inspections.

No NDI was required.

6 LIMITED USER EVALUATION

The limited users evaluation data is included as appendix C of this document.

The following events were conducted during the Limited User Evaluations.

(1) Squad Offense (Day and Night) - Range 5
(2) Convoy Fires – Range 5
(3) Accuracy - Range 5

6.1 SQUAD OFFENSIVE EVALUATION

The MSGL was evaluated for its ability to be integrated into the mission profiles of the Marine Rifle Squad. A squad equipped with MSGL conducted day and night blank fire attacks across a danger area.

6.1.1 Evaluation Procedure

The following test procedure was used:

(1) The squad will be issued with blank 5.56 ammunition and a mixture of 40mm TP and illumination rounds.
(2) The squad will conduct two daytime attacks.
(3) The squad will conduct two nighttime attacks.
(4) Squad members who employed the MSGL in the attacks will fill out questionnaires regarding system performance.

6.2 CONVOY FIRES EVALUATION

The MSGL was evaluated for its ability to be integrated into the mission profiles prevalent in the OIF Area of Operations. Shooters equipped with MSGL conducted break-contact type fires from a moving HMMWV.

6.2.1 Evaluation Procedure

The following procedure was used:

(1) MSGL shooters will be issued with 40mm TP rounds.
(2) Shooters will embark HMMWV.
(3) Each shooter will engage designated target from the port side of the vehicle on one pass.
(4) Each shooter will switch seats and engage designated target from the starboard side of the vehicle on the next pass.
(5) Marines who employed the MSGL will fill out questionnaires regarding system performance.

6.3 ACCURACY

The MSGL was evaluated for its ability for users to accurately engage targets at various distances.

6.3.1 Evaluation Procedure

The following procedure was used:

(1) MSGL shooters will be issued with 40mm TP rounds.
(2) Shooters will engage targets in accordance with the M203 qualification course of fire as per FM 3-22-31.
(3) Marines who employed the MSGL will fill out questionnaires regarding system performance.

6.4 LIMITED USER TEST RESULTS:

Detailed test results and user questionnaires are included as Appendix C.
Summary of results is as follows:

The MSGL Limited User Evaluation was conducted at MCB Quantico Range 5 on 22 June 2005. Thirteen Marines from Instructor Battalion, The Basic School, participated in the evaluation as a T/O rifle squad. Of the thirteen Marines, one was a sergeant, seven were corporals, and five were lance corporals. All were 0311s with an average time in service of 4.5 years, and most had combat experience in the GWOT.

The course of fire consisted of a new equipment training session, safety brief, familiarization fire, qualification course, convoy live fire, daytime attacks, and nighttime attacks. Over the course of fire, over 750 rounds of 40mm ammunition of various types were expended, with the average Marine firing over 50 rounds.

Overall, feedback was very positive on the system. On the post-evaluation surveys, the average response on the weapon effectiveness scale (1-7, with 1 being completely ineffective and 7 being completely effective) was 5.98. The general consensus was that the system was accurate, lethal, comfortable, compact, and easy to operate. The concerns that were voiced included issues such as back-up sights, difficulty sighting at longer ranges with the occluded eye-type gunsight, difficulty in making windage and elevation adjustments, reloading on the move or in combined spaces, and the provision for a back-up weapon.

7 SUMMARY

Testing was completed for the MILKOR Multi-Shot Grenade Launcher.

There were no unsafe conditions noted during any of the evaluations or tests.

The weapons functioned during all environmental conditions with only minor deviations as noted.

Reliability of weapon function was 100% with no misfires, ammunition reliability of 99% for the HEDP after a total of 310 HEDP rounds with 3 failures to detonate.

Appendix A: Test Data Cards

UNITED STATES MARINE CORPS
MARINE CORPS SYSTEMS COMMAND
Ordnance Test Facility
Bldg. #2247 Willis St.
Quantico, VA 22134

TEST ARTICLE CUSTODY RECORD

Origination Date: 8 June 05

PROJECT OFFICER, Capt. John Douglas
Print Name/Rank
MarCorSysCom 432-3626
Unit / Organization **Phone #**

Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULT-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: MGL-140
SERIAL NUMBER: 305002
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
080605/1400	NORTON	OTF	PROCESS	
080605/1430	NORTON	OTF	VISUAL INSP.	
090605	LYONS	Range 15	Test Plan	Test Cards
210605	Shire	Salt Fog OTF	Salt Fog	Test Report

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

DUPLICATION AUTHORIZED

Section 4.1.5 – VISUAL INSPECTION CHECKLIST

Manufacturer / Vendor: MILKOR USA
Serial Number: 305007
Nomenclature / Model Number: MGL-140
OTF ID Number: 051301

	Title	Results:	P – spec. Para#	Requirement
4.1.5 b.(3)	Length	29.5" BUTT STOCK IN 33.0 BUTT STOCK OUT		
4.1.5 b.(4)	Weight	15.38 lbs W/SLING		
4.1.5 b.(5)	Magazine capacity, number of rounds and dimensions of magazine / chamber.	6 RDS. 40x140mm 5.25 L		
4.1.5 b.(6)	Safety type, location, indication method, misfire advance.	-THUMB LEVER SAFETY WITH VISUAL S WHEN ON SAFE - MIS FIRE ADVANCE - WIND-UP SPRING ACTION		
4.1.5 b.(7)	Sights type / description	-OCCLUDED SIGHT/BATTERY POWER - CROSS HAIR TYPE RETICLE		
4.1.5 b.(8)	Accessories, manuals and tools supplied	-OPERATING INSTRUCTIONS - SLING - CLEANING KIT - CARRY BAG W/STRAP		
4.1.5 b.(9)	Noted material discrepancies			
4.1.5 b.(10)	Any actual or possible interference with the weapon's performance.			

Inspections Data Card
date 14 Jun 05

Test Item Description	M60E	Test Procedure Number	
Serial Number	05 BOI - M60 140 305002		

Safety Selector Test
safety selector test. not able to override safety
- will not fire out of time,

Disassembly / Misassembly
only item in field strip is gas piston will not advance without it. can not be installed backwards
No safety related

Parts Interchangebility

Inspections Data Card

date 6/19/05

Tactical Sling

Standing removed sling	18 rds	no issues
K Neeling	24 rds	no issues
Prone	18 rds	no issues
Prone Retracted stock	6 rds	
	66 rds	

Endurance Test Data Card

date 14 June

Test Item Description	M 96 L	Test Procedure Number	TEP 05014 009
Endurance Test Method	actual live fire		
Serial Number	05BO1	M6L 190 - 305002	

Date:	Time:	Condition:	Cycles:	Sub Total:	TIR: If Applicable
14 Jun	1330	tactical firing	66 rds	66	
		Altitude	22 rds	88	
		Ammo Compatability	3 HE		
			3 smoke		
			3 baton		
			3 rubber ball		
			3 HE		
			3 Illum	106 rds	
		Rate of fire	12 rds	118 rds	
		HEDP	24 rds	142	1 stoppage failed to advance
		CS	20 rds	162	no malfunctions
		HEDP	18 rds 2 mags	180	no malfunctions
	15:25	HEDP	6 rds 300	6 fired	5 detonate (4 possible)
		HEDP	18 rds	204	no malfunctions
		Smoke	17 rds		no malfunctions
Alignment Pin		HEDP	72 rds		1 failed to fire last rd
on ejector failed					
			293		
		AP	5 rds		
		non lethal	20 ball		
14 June	18:00		20 baton		

46 non lethal
5 AP
20 CS
20 Smoke

100 TP
144 HEDP

PAGE ____ of ______

Rate of Fire Test Data Card

date 14 Jun

Test Item Description	MILKOR	Test Procedure Number	TEP 05 07F 001
Serial Number	05 B01		

Date:	Time:	Elapsed Time	Round Type	Number of Rounds:	TIR: If Applicable
14 Jun	14:30	21	TP	6	
14 Jun	14:35	19 sec	TP	6	
		avg 30 sec / 5 rds =		0.6 sec	
		~~cyclic~~ rate =		100 rds/min	
				~~2.5/min~~	
				2.5 sec.	

Ammunition Compatibility Test Data Card

date 6/14

Test Item Description	M360	Test Procedure Number	Tep 05 of 001
Serial Number	05 Box 2		

Date:	Time:	Condition:	Round Type	Number of Rounds:	TIR: If Applicable
6/14	1350	good	3HE 3 Smoke	6 rds	all functioned no issues
	1350	Bottom - Bull - Foam Rubber			
		Bottom - 3 HE	All Functioned no issues		

Attitude Firing Test Data Card

date_____

Test Item Description	MSGL	Test Procedure Number	Top 05 OF 001
Serial Number			

Date:	Time:	Condition:	Attitude	Number of Rounds:	TIR: If Applicable
6/14	14:00	good	Right up	1rd	
			Left up	1rd	
			Bottom up	1rd	
			Vertical Muzzle up	1rd	
			left up	3rds	
			right up	3rds	
			bottom up	3rds	
			Muzzle up	3rds	No Mal Functions
			Collapsed Stack	6rds	
					16rds
					22rds

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Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULTI-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: MGL-140
SERIAL NUMBER: 305003
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
080605/1400	NORTON	OTF	PROCESS	
15 Jan	LYONS	Range 15	Cold Test	

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

DUPLICATION AUTHORIZED

Test Data Card **date** 19 June 05

Drop Test	Time	Temp	Remarks
	1400	+198°F	Dropped Top up, checked clay Rotated cyl, upon on Fire
Top Up			
Top Down	1400	+148°F	Dropped Top Down, checked clay Rotated cyl, upon on Fire
Right Up	1400	+148	Dropped Right up, checked clay Rotated Cyl, upon on Fire
Left ~~Down~~ up Rad	1401	+146	Dropped Left up, checked clay Rotated cyl, upon on Fire
Muzzle Up	1401	+146°F	Dropped muzzle up, checked clay Rotated cyl, upon on Fire
Muzzle Down	1401	+145°F	Dropped muzzle Down, checked clay Rotated cyl, upon on Fire

Final Inspection:

Once all 6 axis had been Tested, The upon was Re cocked And Fired on All 6 cyl. All 6 clay Primers showed Good Firing Pin Strikes

Test Data Card date 6/28

Drop Test	Time	Temp	Remarks
Top Up	13:00	-28F	dropped top up rotated cyl.
Top Down	13:00	-28F	dropped top down rotated cyl. - damaged sight + pad grip
Right Up	13:00	-27F	dropped Right up rotated to next chamber
Left ~~Down~~ up RH	13:00	-27	dropped Left up rotate cyl.
Muzzle Up			dropped muzzle up shoulder stock retracted rotate cyl
Muzzle Down			dropped muzzle down rotate cyl. to step.
Final Inspection: opened cyl. no indication of primer impact. reset cylinder dry fire and advance each chamber. all 6 primers show good impact.			

Test Data Card date 15 June

Test Item Description	M50L	Test Procedure Number	
Test (Hold/Cold)	Cold Test		
Weapon Serial Number	05B02		
Configuration (wet/dry, extended/retracted)	dry - clean - unfired		
Preconditioned?	no		

Chamber Conditioned	Time	Temperature	
Test Article in Chamber	Time	Temperature	
0:00 0	0615	-34.5	
0:30			
1:00			
1:30			
2:00	0815	-34.7	
2:30			
3:00	0930	-26	
3:30			
4:00	1000	29.6	
~~4:30~~			
5:00			
5:30			
6:00			

Test Data Card date_____

Test Item Description	MSGL	Test Procedure Number	
Test (Hold/Cold)	Cold		
Weapon Serial Number	05 802		

Rounds Fired	Time	Temp	Remarks
1 6	1030	-28	slow to advance required
2 6	1035	-28	" manual advance
3 6	1040	-28	"
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Final Condition: Inspection showed, no issues			

Test Data Card date 30 Jan 05

opn 05B02 - 3 time for drop test. same opn.

Drop Test	Time	Temp	Remarks
Top Up	0900	74°F	Dropped rotate cyl.
Top Down			Dropped rotated cyl. Damaged sight no longer serviceable
Right Up			Dropped rotate cyl
Left ~~Down~~ UP			Dropped rotate cyl.
Muzzle Up			Dropped rotate cyl Damaged buttstock.
Muzzle Down			Dropped. checked primers all good. Dropped again on asphalt.

Final Inspection:

reset cyl. fired on all 6 chambers.
- primers show good impacts
- No safety issues, some damage to attachments

21 June 2005 1600

Start Salt/Fog for M5GL

Ran function check

Loaded Dummy Rounds

Documented Pre Test Condition with Pictures

---

22 June 2005 1600

Removed M5GL

Ran Function check

Dry Fired all Six Rounds

M5GL Functional

Documented with Pictures

---

23 June 2005 1600

Removed M5GL

Documented Condition with Pictures

Ran function check Trigger Has slight Sticking

---

30 June 2005

Found Gas Piston Corosion

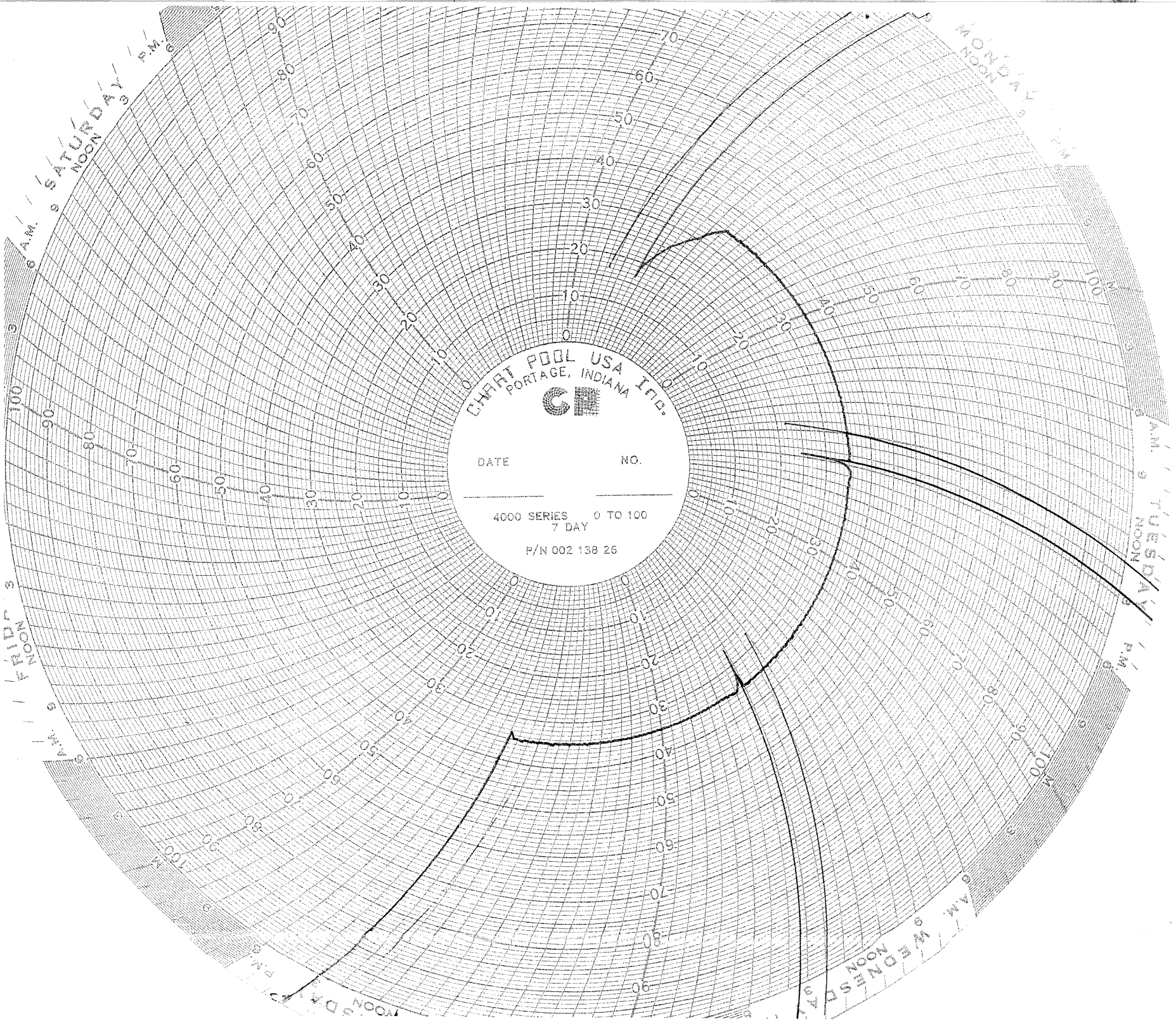
CHART POOL USA LTD.
PORTAGE, INDIANA
DATE
NO.
4000 SERIES 0 TO 100
7 DAY
P/N 002 138 26
SATURDAY
MONDAY
TUESDAY
WEDNESDAY
FRIDAY
NOON
A.M.
P.M.

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Unit / Organization **Phone #**

Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULTI-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: MGL-140
SERIAL NUMBER: 3050004
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
050605/1400	NORTON	OTF	PROCESS	
15Jun	LYONS	Range 15	function test	

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

DUPLICATION AUTHORIZED

0580S

6/15

Functional Free

0926 – Fire Ends TP

no issues noted.

UNITED STATES MARINE CORPS
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Origination Date: 8 June 05

PROJECT OFFICER, Capt. John Douglas
Print Name/Rank
MarCorSysCom 432-3626
Unit / Organization **Phone #**

Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULTI-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: MGL-140
SERIAL NUMBER: 305005
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
08 Dec 05/1400	NORTON	OTF	PROCESS	
09/15/05	LYONS	Range 15	function ✓	

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

DUPLICATION AUTHORIZED

.05 B 04 6/15/05

Functional Testing

~~7~~8 rds TP

no issues noted.

UNITED STATES MARINE CORPS
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Origination Date: 8 June 05

PROJECT OFFICER, Capt. John Douglas
Print Name/Rank
MarCorSysCom — 432-3626
Unit / Organization — **Phone #**

Subj: Custody Record for Test Articles.

Item Description:

Project Description: MULTI-SHOT GRENADE LAUNCHER
Vendor: MILKOR USA
Model Number: ML-140
SERIAL NUMBER: 305007
Item Description: GRENADE LAUNCHER
Condition (New/Refurbished/Serviceable/Unserviceable):
Received Date:
Received By:

Date/Time	Responsible Individual	Location	Test Being Conducted	Test Report
08/06/05/1400	NORTON	OTF	PROCESS	
06/15/05	CYONS	Range 15	function ✓	

FINAL DISPOSITION:

Condition:
Location:
Date/Time:
Test Report:
Responsible Individual:

05 BOS 6/15/05

Function Check

Fire Cards TP.

no issues noted.

Appendix B: LUE Results

The MSGL Limited User Evaluation was conducted at MCB Quantico Range 5 on 22 June 2005. Thirteen Marines from Instructor Battalion, The Basic School, participated in the evaluation as a T/O rifle squad. Of the thirteen Marines, one was a sergeant, seven were corporals, and five were lance corporals. All were 0311s with an average time in service of 4.5 years, and most had combat experience in the GWOT.

The course of fire consisted of a new equipment training session, safety brief, familiarization fire, qualification course, convoy live fire, daytime attacks, and nighttime attacks. Over the course of fire, over 750 rounds of 40mm ammunition of various types were expended, with the average Marine firing over 50 rounds.

Overall, feedback was very positive on the system. On the post-evaluation surveys, the average response on the weapon effectiveness scale (1-7, with 1 being completely ineffective and 7 being completely effective) was 5.98. The general consensus was that the system was accurate, lethal, comfortable, compact, and easy to operate. The concerns that were voiced included issues such as back-up sights, difficulty sighting at longer ranges with the occluded eye-type gunsight, difficulty in making windage and elevation adjustments, reloading on the move or in combined spaces, and the provision for a back-up weapon.

LUE Qualification Scores

Station 1: Two bunker targets (one 100m, one 125m) = 3 rounds
Station 2: Two bunker targets (one 150m, one 175m) = 3 rounds
Station 3: Two clusters of troop silhouettes in open (one 250m, one 350m) = 3 rounds
Total possible hits = 9

Shooter	Station 1	Station 2	Station 3	Total
1	3	2	1	**6**
2	3	1	1	**5**
3	1	2	1	**4**
4	0	2	2	**4**
5	3	2	1	**6**
6	3	0	1	**4**
7	1	1	1	**3**
8	3	3	1	**7**
9	2	2	1	**5**
10	3	2	1	**6**
11	1	2	1	**4**
12	2	3	1	**6**
13	3	2	1	**6**

Average 100m-125m = 2.15 (72%)
Average 150m-175m = 1.85 (62%)
Average =250m-350m = 1.08 (36%)
Overall Average = 5.08 (56%)

**Comparable M203 scores not available for this squad. According to FM 3-22-31 *40mm Grenade Launcher M203*, passing qualification score is 33%. All Marines in this squad passed the qualification with the MSGL.

24 June 2005

MSGL LUE User Questionnaire Responses

When: 22 June 2005 at Range 5, MCB Quantico
Who: a 13-man rifle squad from E&I Co., TBS
Shooter Info:

Rank	LCPL	CPL	Sgt
	5	7	1
MOS	0311	0311	0311
Yrs in USMC	2-3	4	5 -6
	3	5	5

Question 1. Rate your ability to achieve a good sight picture.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					4	6	3	*5.92*

Comments.
User 2 – there should be a secondary aiming sight.
User 3 – fairly easy once we got used to keeping both eyes open.
User 4 – targets beyond 275 yds harder to sight in on, overall still able to get effects on target.
User 5 – 250 meters and out need to have a different sight.
User 9 – long distances it is hard because sight is pointed at barrel, if sight was canted to one side or the other would be better.
User 11 – don't really have a good reference to line up with.
User 12 – using scope at long ranges takes some getting used to.
User 13 – barrel mass was a problem for 250 meters and out.

Question 2. Rate your ability to achieve satisfactory eye relief.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					2	3	8	*6.46*

Comments.
User 2 – collapsible buttstock is a good idea since all Marines body structures is different.
User 3 – the telescopic buttstock makes eye relief almost a non-factor.
User 4 – still able to keep alert with both eyes and get a good sight picture is nice.
User 9 – took a little bit to get it, it was harder at longer distances because of the sight pointing at the barrel.

Question 3. Rate your ability to achieve satisfactory stock weld.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses		1	1	1	1	5	4	***5.54***

Comments.
User 2 – with more training, this will come naturally.
User 3 – stock weld was easy to achieve because of the clean & simple design of the system.
User 9 – I really liked how you are able to cant barrel up or down, it helps out with stock weld.
User 10 – due to changing range apparatus, stock weld was difficult to maintain constant.
User – 13 – stock weld was only achieved between 0-100 meters.

Question 4. Rate your ability to zero the weapon.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses			1	2	3	4	3	***5.46***

Comments.
User 2 – weapon sight was maxed out and I still had to aim low and to the right.
User 3 – zeroing was simple, only problem is the scope needs to have a wider angle of adjustment.
User 4 – extremely accurate zero, and easy to achieve.
User 5 – weapon was firing high and to the left.
User 9 – the sight was moved all the way yet I still had to aim way low of the target.
User 10 – more adjustment room is needed.
User 11 - should have a way to adjust sight as can in M16A2.
User 12 – shoots to high.

Question 5. Rate your ability to adjust the sights for windage.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses	1	1	1	3	2	1	1	***4.1***

Comments.
User 2 – maxed out all the way to the right and was still off.
User 3 – same as #4, the sights need to have a wider angle of adjustment.
User 4 – hard to do without a tool or someone to help, needs knobs instead of screws.
User 5 – tool required for sight adjustment needs to be part of SL3 gear.
User 7 – did not adjust for windage, needs and adjustment tool, does prohibit windage adjustment while on the move.
User 8 – I did not adjust the sights, try to adjust without tool so you can adjusts on the move.
User 9 – need to make sights were I don't need a tool to make adjustments.
User 10 – could not adjust enough.
User 11 – same as above. (should have a way to adjust sights as can in M16A2).

Question 6. Rate your ability to adjust the sights for elevation.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses	1			1	2	2	5	***5.64***

Comments.
User 2 – its better to Kentucky windage than to adjust.
User 3 – again the clean design and the simplicity of elevation on sights were very user friendly.
User 9 – need to make sights were I don't need a tool to make adjustments.
User 10 – could not adjust enough.

Question 7. Rate the weapon's effectiveness throughout the various combat shooting positions (standing/kneeling/prone).

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses						5	8	***6.62***

Comments.
User 2 – not so great on the prone position, but we might need more practice.
User 3 – the ease of transition from one firing position to the next was greatly increased by being able to adjust the angle of the buttstock and the compact design of the system.
User 4 – able to achieve good sight picture and stability with each position.
User 9 – was very effective and accurate after getting BZO.
User 10 – once I figured out where the round would impact, I was "steel on steel"
User 13 – I was able to put rounds within killing radius without a problem.

Question 8. Rate your ability to engage stationary targets.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses				1		1	11	***6.69***

Comments.
User 2 – weapon is very accurate.
User 3 – the sighting scope made stationary target engagement an almost point and shoot system.
User 4 – with the proper range set, its extremely easy.
User 9 – very accurate sight makes it easy to make adjustments from last shot impact.
User 11 – will get a little heavy and wobbly.

Question 9. Rate your ability to engage targets using supported shooting positions.

Completely Ineffective — Completely Effective — *Avg.*

Score	1	2	3	4	5	6	7	
Responses						3	10	*6.77*

Comments.
User 2 – more stability = better shooting.
User 3 – again the adaptability of the weapon to change stock length, angle and the position of the front hand grip made using a supported position comfortable and practical.
User 4 – extremely easy and comfortable.
User 9 – very accurate.

Question 10. Rate your ability to quickly present your weapon and engage targets.

Completely Ineffective — Completely Effective — *Avg.*

Score	1	2	3	4	5	6	7	
Responses					1	7	5	*6.31*

Comments.
User 2 – when fully loaded the weapon is heavy and it takes a little muscle to put on target.
User 3 – it's a pretty straight forward system.
User 4 - easier than the M16.
User 9 – very nice but need a little practice to get use to sights.
User 11 – there should be a way to keep the radical on tgt all the time, that way you don't have to stop and push the button if under fire.

Question 11. Taking all factors into consideration, rate weapon suitability for engaging targets at known distances.

Completely Ineffective — Completely Effective — *Avg.*

Score	1	2	3	4	5	6	7	
Responses					1	3	9	*6.62*

Comments.
User 2 – sights are generally accurate on distance.
User 3 – the sights easy readability & adjustability made engaging KD targets very accurate and quick.
User 4 – accurate weapon once zeroed.
User 9 – sights were very accurate, easy to engage point targets.
User 10 – need to better adjust elevation & windage, used consistency "Kentucky windage".
User 13 – buttstock has slight vertical movement.

Question 12. Rate your ability to conduct fire and movement with the weapon during daytime attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses				1	1		1	5.33

Comments.
User 7 – reloading in prone position presented problem for being able to reengage targets rapidly.
User 13 – reloading is a problem due to casings getting stuck in the cylinder.

Question 13. Taking all factors into consideration, rate the weapon's suitability for engaging targets at unknown distances during daytime squad attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses						2	1	*6.33*

Comments.
User 7 – reloading takes time while in the prone.
User 13 – buttstock has slight vertical movement.

Question 14. Rate your ability to conduct fire and movement with the weapon during nighttime attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses						1	1	*6.5*

Comments.
User 5 – sights help but reloading and re-cocking is difficult.
User 8 – little hard reload but in time will be good.

Question 15. Taking all factors into consideration, rate weapon suitability for engaging targets at unknown distances during nighttime squad attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					1		1	*6.00*

Comments.
User 5 – hard to gage distance at first, but more training will help.

Question 16. Rate your ability to engage targets while riding on vehicle port side.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					2	6	5	***6.23***

Comments.

User 2 – trigger can be operated easy, size of the weapon is excellent inside vehicles, but hard to be accurate from weak shooting side.

User 3 – the compact design of the system made it easy to maneuver & reload in the confines of a vehicle.

User 4 – easier to shoot and reload being a right handed shooter.

User 9 – ability is a little easier then M16/203 because of the shortness of the weapon.

User 10 – good for right handed shooters.

Question 17. Rate your ability to engage targets while riding on vehicle starboard side.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses			1	1	2	4	5	***5.85***

Comments.

User 2 – easy to reload due to the size of weapon, can maneuver the weapon in small places.

User 3 - the compact design of the system made it easy to maneuver & reload in the confines of a vehicle.

User 4 – not easy to reload being right handed.

User 9 – little harder because left handed.

User 10 – had to be perpendicular to general target direction.

Question 18. Taking all factors into consideration, rate weapon suitability for engaging targets from inside a moving vehicle.

Completely Ineffective							Completely Effective	*Avg.*
Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses				1	2	7	3	*5.92*

Comments.

User 1 – need to find a quicker to help the shooter to spin the breach.
User 2 – hard to find a sight picture but great to suppress.
User 3 - the compact design of the system made it easy to maneuver & reload in the confines of a vehicle.
User 4 – very doable. Awkward at times, but you can engage targets.
User 7 – need of a drop pouch for extra rounds. Cramped conditions do make it difficult.
User 8 – it is good shooting from a vehicle, if you are suppressing an area for example, if you get ambushed you can suppress the area real quick.
User 9 – easy to get up and present to target because of the short barrel.
User 10 – accuracy is somewhat compromised, but is good for covering fire while leaving or going through an ambush site.
User 11 – Bouncy, would be difficult to hit a point target if necessary.

Question 19. FOR LEFT HANDED SHOOTERS ONLY: Rate the weapon's design for left-handed shooters.

Completely Ineffective							Completely Effective	*Avg.*
Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses					2	1		*5.33*

Comments.

User 3 – it seems to be an ambidextrous system though if the breach would open to both sides it would make it easier for left-handed shooters.
User 7 – reloading left-handed needs adequate practice time.
User 9 – shooting and aiming were fine but unloading and loading were difficult, need to make breach swing either way.

20. Please list any safety issues you could foresee.

User 2 – keep in mind the angle of the barrel when shooting, especially from a window. You don't want to hit the ledge because the barrel was not or had enough clearance.
User 3 – from my experience the system seemed very safe.
User 6 – misfire procedures.
User 9 – misfire procedures if a Marine has a hang fire and then just roles past round it could explode in his face. My solution: make sure Marines are well informed of the safety features of the weapon.
User 10 – could not think of any at this time.

(Question 20 continued)

User 11 – Speed on reloading, should be/have something that would speed up the reloading process. The sling looks like it would pop out and fall off at any given time, could be bad if sling on back while moving. The buttstock is wobbly, could break. The safety is a little hard to manipulate.

User 13 – I could not see any safety issues due to weapon career.

21. Please list any other problems you could foresee with the system or its employment.

User 2 – time to reload, awkward to carry, very bulky, battery life on the sight (no batteries).

User 4 – before you can shoot you must cock the revolving chamber which is awkward. Having a knob like those used on steering wheels to get a good turn would be great. If the batteries go down on the sight there is no alternative sight.

User 5 – what secondary weapon will you put with this weapon?

User 6 – need an alternate sight in case the electric sight goes down.

User 7 – need a secondary weapon. Ranges of 250 meters plus presents problem of barrel mass for sight.

User 8 – a way to do some type of quick reload without having to de-cock, then re-spin, load and get back into the fight. For example, you fire 3 rounds and you get a chance to reload.

User 9 – left handed shooters will have hard time with reloading, should make the breach swing either way. Need to have another way to aim weapon if the batteries in the sight dies.

User 10 – when zeroing and BZO more adjustment room is needed, alternate or secondary weapon needed.

User 11 – heavy: cut down the weight. Reloading process needs to be faster. Secondary weapon: what is it? Alternate sight: should have another incase the battery goes down.

User 13 – the barrel gets in way of the sight at 275 meters and out. Winding cylinder could become difficult when fine motor skills are gone in combat situations. A full size rifle (M16) could become difficult to utilize when carrying this weapon. Spent casings get stuck in cylinder even after utilizing extractor bushing. Numbers on cylinders should glow for night time operations.

22. Additional Comments.

User 1 – if this is going to be the prime weapon, what is going to be the secondary weapon?

User 2 – secondary sight, back-up weapon?

User 5 – Sights: need to have an adapter on the rail system for a quadrant sight in case the primary optic battery dies.
Reload: half moon clips could help with quick reload & re-cocking the weapon.

User 7 – weapon performs well, with time & practice can be employed with devastating effects.

User 8 – secondary sights, other than that with some more trigger time this will be a very effective weapon in a combat environment.

User 10 – "iron sights", or alternate means of accurately engaging threats if battery fails. Offset sights for easier target acquisition. Will be an important asset in a combat zone.

User 11 – think with more time on the weapon and more PMEs weapon will be very effective.

User 12 – there should be some kind of winding handle instead of putting your fingers in the barrel.

User 13 – overall great weapon to fire and I was confident in firing.

SALT-FOG TEST REPORT
FOR THE
MULTI-SHOT GRENADE LAUNCHER (MSGL)

1.0 <u>Background</u>

USMC PM IWS, Quantico, Virginia, requested that OTF perform a salt-fog test for the MSGL.

The Test Evaluation Plan for the MSGL states the MSGL shall determine the effectiveness of protective coatings and finishes on the MSGL and to determine the effects of salt deposits on the physical aspects and operation of the MSGL.

The salt fog test performed is a tailored version of Mil-Std 810F method 509.4

The test took place from 21 June – 23 June 2005 at Ordnance Test Facility Quantico, Va building 2247

<u>2.0 Method</u>.

Prepare a salt fog chamber – the salt fog should be generated from a 5 ± 1 percent saline (NaCl) solution produced by dissolving 5 parts of salt in 95 parts (by weight) of distilled water.

Precondition the chamber to 35 ± 1.5°C (95 ± 3°F) for approximately 12 hours.

Orientate the MSGL at fifteen degrees to the horizontal in the salt fog chamber.

a. Condition the test MSGL for a 48 hours in the salt fog chamber. The chamber temperature should be maintained at 35 ± 1.5°C.
b. Remove the MSGL and inspect after 24 hours.
f. Function test MSGL.
g. Inspect the for damage or material deterioration.
h. Record results.
i. Return weapon to the environmental chamber for 24 hrs.
j. Repeat f, g, & h.

<u>3.0 Data Required</u>.

<u>3.1</u> Record temperatures and humidity.

<u>3.2</u> Record results.

<u>3.3</u> Record any malfunctions.

4.0 Test results

4.1 Test Article# B01 was cleaned lubricated then shoot 478 RDS Prior to testing.

4.2 Placed into the environmental chamber.

4.3 At 24 hrs the test article was removed and inspected. Dry fired 6 rounds. Below are dummy rounds prior to testing and after function test. Note: the

modeling clay has been penetrated by the firing pin after function check.

4.4 After inspection the test article was returned to the chamber for 24 hrs.

4.5 The test article was removed after 24 hrs. Then inspected for damage or material deterioration.


JUN 23 2005


JUN 23 2005


JUN 23 2005

Despite the corrosion noted above the weapon still functioned. The last picture above is the gas piston with obvious corrosion. No live fire test was done after salt/fog testing.

5.0 **Conclusions**

This weapon survived salt/fog in 5% salt-water solution with minor corrosion. There was no evidence of finish loss and no pitting in material after 48 hours. This weapon appears safe for use after exposure to salt-water when proper maintenance is performed soon after exposure.

24 June 2005

MSGL LUE User Questionnaire Responses

When: 22 June 2005 at Range 5, MCB Quantico
Who: a 13-man rifle squad from E&I Co., TBS
Shooter Info:

Rank	**LCPL**	**CPL**	**Sgt**
	5	**7**	**1**
MOS	**0311**	**0311**	**0311**
Yrs in USMC	**2-3**	**4**	**5 -6**
	3	**5**	**5**

Question 1. Rate your ability to achieve a good sight picture.

Completely Ineffective							Completely Effective	***Avg.***
Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses					4	6	3	***5.92***

Comments.
User 2 – there should be a secondary aiming sight.
User 3 – fairly easy once we got used to keeping both eyes open.
User 4 – targets beyond 275 yds harder to sight in on, overall still able to get effects on target.
User 5 – 250 meters and out need to have a different sight.
User 9 – long distances it is hard because sight is pointed at barrel, if sight was canted to one side or the other would be better.
User 11 – don't really have a good reference to line up with.
User 12 – using scope at long ranges takes some getting used to.
User 13 – barrel mass was a problem for 250 meters and out.

Question 2. Rate your ability to achieve satisfactory eye relief.

Completely Ineffective							Completely Effective	***Avg.***
Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses					2	3	8	***6.46***

Comments.
User 2 – collapsible buttstock is a good idea since all Marines body structures is different.
User 3 – the telescopic buttstock makes eye relief almost a non-factor.
User 4 – still able to keep alert with both eyes and get a good sight picture is nice.
User 9 – took a little bit to get it, it was harder at longer distances because of the sight pointing at the barrel.

Question 3. Rate your ability to achieve satisfactory stock weld.

Completely Ineffective — Completely Effective — ***Avg.***

Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses		1	1	1	1	5	4	***5.54***

Comments.
User 2 – with more training, this will come naturally.
User 3 – stock weld was easy to achieve because of the clean & simple design of the system.
User 9 – I really liked how you are able to cant barrel up or down, it helps out with stock weld.
User 10 – due to changing range apparatus, stock weld was difficult to maintain constant.
User – 13 – stock weld was only achieved between 0-100 meters.

Question 4. Rate your ability to zero the weapon.

Completely Ineffective — Completely Effective — ***Avg.***

Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses			1	2	3	4	3	***5.46***

Comments.
User 2 – weapon sight was maxed out and I still had to aim low and to the right.
User 3 – zeroing was simple, only problem is the scope needs to have a wider angle of adjustment.
User 4 – extremely accurate zero, and easy to achieve.
User 5 – weapon was firing high and to the left.
User 9 – the sight was moved all the way yet I still had to aim way low of the target.
User 10 – more adjustment room is needed.
User 11 - should have a way to adjust sight as can in M16A2.
User 12 – shoots to high.

Question 5. Rate your ability to adjust the sights for windage.

Completely Ineffective — Completely Effective — ***Avg.***

Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses	1	1	1	3	2	1	1	***4.1***

Comments.
User 2 – maxed out all the way to the right and was still off.
User 3 – same as #4, the sights need to have a wider angle of adjustment.
User 4 – hard to do without a tool or someone to help, needs knobs instead of screws.
User 5 – tool required for sight adjustment needs to be part of SL3 gear.
User 7 – did not adjust for windage, needs and adjustment tool, does prohibit windage adjustment while on the move.
User 8 – I did not adjust the sights, try to adjust without tool so you can adjusts on the move.
User 9 – need to make sights were I don't need a tool to make adjustments.
User 10 – could not adjust enough.
User 11 – same as above. (should have a way to adjust sights as can in M16A2).

Question 6. Rate your ability to adjust the sights for elevation.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses	1			1	2	2	5	***5.64***

Comments.
User 2 – its better to Kentucky windage than to adjust.
User 3 – again the clean design and the simplicity of elevation on sights were very user friendly.
User 9 – need to make sights were I don't need a tool to make adjustments.
User 10 – could not adjust enough.

Question 7. Rate the weapon's effectiveness throughout the various combat shooting positions (standing/kneeling/prone).

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses						5	8	***6.62***

Comments.
User 2 – not so great on the prone position, but we might need more practice.
User 3 – the ease of transition from one firing position to the next was greatly increased by being able to adjust the angle of the buttstock and the compact design of the system.
User 4 – able to achieve good sight picture and stability with each position.
User 9 – was very effective and accurate after getting BZO.
User 10 – once I figured out where the round would impact, I was "steel on steel"
User 13 – I was able to put rounds within killing radius without a problem.

Question 8. Rate your ability to engage stationary targets.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses				1		1	11	***6.69***

Comments.
User 2 – weapon is very accurate.
User 3 – the sighting scope made stationary target engagement an almost point and shoot system.
User 4 – with the proper range set, it's extremely easy.
User 9 – very accurate sight makes it easy to make adjustments from last shot impact.
User 11 – will get a little heavy and wobbly.

Question 9. Rate your ability to engage targets using supported shooting positions.

Completely Ineffective — Completely Effective — ***Avg.***

Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses						3	10	***6.77***

Comments.
User 2 – more stability = better shooting.
User 3 – again the adaptability of the weapon to change stock length, angle and the position of the front hand grip made using a supported position comfortable and practical.
User 4 – extremely easy and comfortable.
User 9 – very accurate.

Question 10. Rate your ability to quickly present your weapon and engage targets.

Completely Ineffective — Completely Effective — ***Avg.***

Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses					1	7	5	***6.31***

Comments.
User 2 – when fully loaded the weapon is heavy and it takes a little muscle to put on target.
User 3 – it's a pretty straight forward system.
User 4 - easier than the M16.
User 9 – very nice but need a little practice to get use to sights.
User 11 – there should be a way to keep the radical on tgt all the time, that way you don't have to stop and push the button if under fire.

Question 11. Taking all factors into consideration, rate weapon suitability for engaging targets at known distances.

Completely Ineffective — Completely Effective — ***Avg.***

Score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Responses					1	3	9	***6.62***

Comments.
User 2 – sights are generally accurate on distance.
User 3 – the sights easy readability & adjustability made engaging KD targets very accurate and quick.
User 4 – accurate weapon once zeroed.
User 9 – sights were very accurate, easy to engage point targets.
User 10 – need to better adjust elevation & windage, used consistency "Kentucky windage".
User 13 – buttstock has slight vertical movement.

Question 12. Rate your ability to conduct fire and movement with the weapon during daytime attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses				1	1		1	**5.33**

Comments.
User 7 – reloading in prone position presented problem for being able to reengage targets rapidly.
User 13 – reloading is a problem due to casings getting stuck in the cylinder.

Question 13. Taking all factors into consideration, rate the weapon's suitability for engaging targets at unknown distances during daytime squad attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses						2	1	***6.33***

Comments.
User 7 – reloading takes time while in the prone.
User 13 – buttstock has slight vertical movement.

Question 14. Rate your ability to conduct fire and movement with the weapon during nighttime attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses						1	1	***6.5***

Comments.
User 5 – sights help but reloading and re-cocking is difficult.
User 8 – little hard reload but in time will be good.

Question 15. Taking all factors into consideration, rate weapon suitability for engaging targets at unknown distances during nighttime squad attacks.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					1		1	***6.00***

Comments.
User 5 – hard to gage distance at first, but more training will help.

Question 16. Rate your ability to engage targets while riding on vehicle port side.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					2	6	5	***6.23***

Comments.

User 2 – trigger can be operated easy, size of the weapon is excellent inside vehicles, but hard to be accurate from weak shooting side.

User 3 – the compact design of the system made it easy to maneuver & reload in the confines of a vehicle.

User 4 – easier to shoot and reload being a right handed shooter.

User 9 – ability is a little easier then M16/203 because of the shortness of the weapon.

User 10 – good for right handed shooters.

Question 17. Rate your ability to engage targets while riding on vehicle starboard side.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses			1	1	2	4	5	***5.85***

Comments.

User 2 – easy to reload due to the size of weapon, can maneuver the weapon in small places.

User 3 - the compact design of the system made it easy to maneuver & reload in the confines of a vehicle.

User 4 – not easy to reload being right handed.

User 9 – little harder because left handed.

User 10 – had to be perpendicular to general target direction.

Question 18. Taking all factors into consideration, rate weapon suitability for engaging targets from inside a moving vehicle.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses				1	2	7	3	***5.92***

Comments.

User 1 – need to find a quicker to help the shooter to spin the breach.
User 2 – hard to find a sight picture but great to suppress.
User 3 - the compact design of the system made it easy to maneuver & reload in the confines of a vehicle.
User 4 – very doable. Awkward at times, but you can engage targets.
User 7 – need of a drop pouch for extra rounds. Cramped conditions do make it difficult.
User 8 – it is good shooting from a vehicle, if you are suppressing an area for example, if you get ambushed you can suppress the area real quick.
User 9 – easy to get up and present to target because of the short barrel.
User 10 – accuracy is somewhat compromised, but is good for covering fire while leaving or going through an ambush site.
User 11 – Bouncy, would be difficult to hit a point target if necessary.

Question 19. FOR LEFT HANDED SHOOTERS ONLY: Rate the weapon's design for left-handed shooters.

Completely Ineffective — Completely Effective

Score	1	2	3	4	5	6	7	*Avg.*
Responses					2	1		***5.33***

Comments.

User 3 – it seems to be an ambidextrous system though if the breach would open to both sides it would make it easier for left-handed shooters.
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User 9 – shooting and aiming were fine but unloading and loading were difficult, need to make breach swing either way.

20. Please list any safety issues you could foresee.

User 2 – keep in mind the angle of the barrel when shooting, especially from a window. You don't want to hit the ledge because the barrel was not or had enough clearance.
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User 6 – misfire procedures.
User 9 – misfire procedures if a Marine has a hang fire and then just roles past round it could explode in his face. My solution: make sure Marines are well informed of the safety features of the weapon.
User 10 – could not think of any at this time.

(Question 20 continued)

User 11 – Speed on reloading, should be/have something that would speed up the reloading process. The sling looks like it would pop out and fall off at any given time, could be bad if sling on back while moving. The buttstock is wobbly, could break. The safety is a little hard to manipulate.

User 13 – I could not see any safety issues due to weapon career.

21. Please list any other problems you could foresee with the system or its employment.

User 2 – time to reload, awkward to carry, very bulky, battery life on the sight (no batteries).

User 4 – before you can shoot you must cock the revolving chamber which is awkward. Having a knob like those used on steering wheels to get a good turn would be great. If the batteries go down on the sight there is no alternative sight.

User 5 – what secondary weapon will you put with this weapon?

User 6 – need an alternate sight in case the electric sight goes down.

User 7 – need a secondary weapon. Ranges of 250 meters plus presents problem of barrel mass for sight.

User 8 – a way to do some type of quick reload without having to de-cock, then re-spin, load and get back into the fight. For example, you fire 3 rounds and you get a chance to reload.

User 9 – left handed shooters will have hard time with reloading, should make the breach swing either way. Need to have another way to aim weapon if the batteries in the sight dies.

User 10 – when zeroing and BZO more adjustment room is needed, alternate or secondary weapon needed.

User 11 – heavy: cut down the weight. Reloading process needs to be faster. Secondary weapon: what is it? Alternate sight: should have another incase the battery goes down.

User 13 – the barrel gets in way of the sight at 275 meters and out. Winding cylinder could become difficult when fine motor skills are gone in combat situations. A full size rifle (M16) could become difficult to utilize when carrying this weapon. Spent casings get stuck in cylinder even after utilizing extractor bushing. Numbers on cylinders should glow for night time operations.

22. Additional Comments.

User 1 – if this is going to be the prime weapon, what is going to be the secondary weapon?

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User 5 – Sights: need to have an adapter on the rail system for a quadrant sight in case the primary optic battery dies.
Reload: half moon clips could help with quick reload & re-cocking the weapon.

User 7 – weapon performs well, with time & practice can be employed with devastating effects.

User 8 – secondary sights, other than that with some more trigger time this will be a very effective weapon in a combat environment.

User 10 – “iron sights”, or alternate means of accurately engaging threats if battery fails. Offset sights for easier target acquisition. Will be an important asset in a combat zone.

User 11 – think with more time on the weapon and more PMEs weapon will be very effective.

User 12 – there should be some kind of winding handle instead of putting your fingers in the barrel.

User 13 – overall great weapon to fire and I was confident in firing.

TEST EVALUATION REPORT FOR THE MULTI-SHOT GRENADE LAUNCHER VENDOR: PENN ARMS

11-JUL-05

VERSION A

DISTRIBUTION STATEMENT D

Distribution of this software documentation is authorized to the Department of Defense (DoD) and U.S. DoD contractors only. Other requests for this document shall be referred to the Commander (Attn: Program Manager for Infantry Weapons), Marine Corps Systems Command, Quantico, Virginia 22134-5010.

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DOCUMENT REVISION HISTORY

Date	Version	Description
11-Jul-05	A	Original draft.

APPROVAL AND AGREEMENT

This is a controlled document maintained by the Team Leader for the Ordnance Test Facility at Marine Corps Systems Command (MCSC). No changes to this document may be incorporated other than those implemented via established KMP Configuration Management (CM) procedures. The undersigned concur with the information contained within this document.

ORDNANCE TEST FACILITY:

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MANAGER, ORDNANCE TEST FACILITY, MARINE CORPS SYSTEMS COMMAND

TABLE OF CONTENTS

1. INTRODUCTION

1.1 PURPOSE

This Test Evaluation Report provides test results based on procedures and techniques that were used to evaluate the Multi-Shot Grenade Launcher (MSGL) in order to determine best value and verify that it is safe for use by operational forces.

1.2 OBJECTIVES

The objective of this test was to enable the Program Manager, Infantry Weapons Systems to make an informed decision on the down selection of an MSGL to meet the desired characteristics as outlined by the Urgent Needs Requirement from MCCDC.

1.3 SCOPE

The MSGL was evaluated for safe and reliable functionality – during normal operating conditions as well as when subjected to adverse environmental conditions. The system was tested in accordance with Ordnance Testing Facility (OTF) TOP/04/OTF/002 – Safety Evaluation Procedures for Hand and Shoulder Weapons.

Environmental testing was conducted by OTF personnel. Environmental Testing evaluated the MSGL for suitable operation and safe functioning in severe environments that the MSGL may encounter while employed. These tests included high and low temperature testing, salt-fog corrosive environments testing, and sand/dust and mud testing.

Reliability of the MSGL was evaluated using a limited number of rounds. The MSGL was be tested to demonstrate compatibility with the ammunition called out in the UNS. The MSGL was tested to a sufficient number of rounds to evaluate functional reliability to include the function of the round on the target (ie, does the HEDP detonate?).

1.4 CHAIN OF COUSTODY

Upon acceptance of the bid samples, a record jacket was established for each sample.

Within the first record jacket for each vendor there is worksheet that was filled out that answers the questions that a technical board may require.

Within all record jackets there is a log sheet that tracks the movement of the test article throughout the entire evaluation process.

The record jacket is used for a control of all worksheets or notes that are used during the evaluation process. All worksheets contain the control number that has been established during the acceptance phase.

All bid samples are marked with a catalog number.

1.5 EVALUATION REPORT

This evaluation report is a separate document for the Penn Arms - Multi-Shot Grenade Launcher.

One report has been established for each sample type and shall consist of all test data, pass/fail criteria, error or variance calculations, interpretations and Test and Measurement Equipment calibration information (as required).

1.6 ACRONYMS AND AMMUNITION DODICS

The following are a list of acronyms and ammunition DODICs used throughout this document and evaluation:

Acronyms

DOD	Department of Defense
HEDP	High Explosive Dual Purposes
IWS	Infantry Weapons Systems
LUE	Limited Users Evaluation
MCCDC	Marine Corps Combat Development Command
MCSC	Marine Corps Systems Command
MRBF	Mean Rounds Between Failures
MRBS	Mean Rounds Between Stoppages
MSGL	Multi-Shot Grenade Launcher
NDI	Non Destructive Inspection
ORM	Operational Risk Management
OTF	Ordnance Test Facility
TEP	Test Evaluation Plan
TOP	Test Operating Procedure

DODICs

BA07 Foam rubber baton
BA08 Rubber ball
B508 Green smoke ground marker
B519 Training practice
B534 Multi shot projectile
B535 White star parachute
B546 HEDP – High Explosive Dual Purpose
B567 C.S. (Teargas)

2. REFERENCE DOCUMENTS:

2.1 **TOP/04/OTF/002** – SAFETY EVALUATION PROCEDURES FOR HAND AND SHOULDER WEAPONS

2.2 **MIL-STD-810F** - ENVIRONMENTAL ENGINEERING CONSIDERATIONS AND LABORATORY TESTS

2.3 **URGENT NEED STATEMENT** –

2.4 **PERFORMANCE SPECIFICATION** - 40MM MULTI-SHOT GRENADE LAUNCHER

2.5 **FM 3-22.31 U.S. ARMY FIELD MANUAL - 40MM GRENADE LAUNCHER, M203**

2.6 **TEP-05-OTF-001 TEST EVALUATION PROCEDURE- MULTI-SHOT GRENADE LAUNCHER**

3. TEST PREPARATION

3.1 PRELIMINARY INFORMATION

3.1.1 Vendor Certification

The Vendors provided at a minimum, certification of the following items prior to any government evaluations. A MCSC Safety Assessment will be completed prior to testing.

A copy of the Safety Assessment is included as an appendix.

Proof Test: The high-pressure test was required prior to delivery to the US Marine Corps. The vendor provided documentation that verifies the weapon is safe to fire and has been demonstrated by firing a high pressure round without catastrophic failure. This data was used to develop safety assessment prior to testing.

3.1.2 Recoil Energy

Recoil energy of the MSGL was not calculated using the formula as described in Reference 1. Sufficient data was not available for the ammunition.

Recoil was estimated based on similarities to the M203 grenade launcher. The MSGL is 15.4 lbs where the M203/M16A2 is 11 lbs. The M203 is rated for unlimited firing so by comparison it is safe to assume the MSGL will not be restricted based on Recoil Energy.

3.1.3 Safety Release

The MSGL was issued a safety release for testing purposes. An Operational Risk Management analysis was completed and approved by the PM IWS for the MSGL and will be observed during testing.

The ORM analysis was reviewed by all personnel involved in the test and following testing and updated using lessons learned.

Safety Assessment Report is included as Appendix A.

3.1.4 Weapon Examination and Inspection

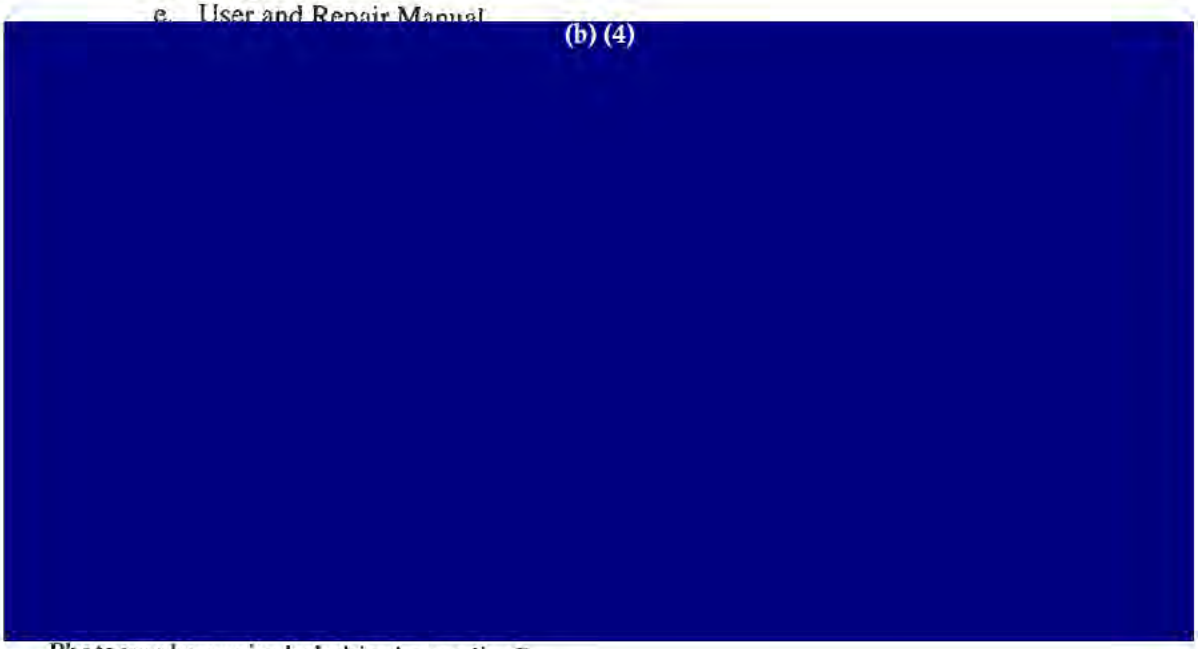
The following examination procedure was conducted prior to conducting any tests on the MSGL system.

a. Disassembled the MSGL and visually examined all major components (i.e. trigger mechanisms, locking arrangement, etc.) for conformance with specifications and design drawings if provided. Record any deviations from specifications.

b. Record the following for the weapon and its ancillary equipment, as applicable:

(1) Manufacturer. Penn Arms
(2) Nomenclature, model, and serial number.
(3) Length 23/33.0 inches
(4) Weight 11.4 lb unloaded
(5) Magazine/ cylinder capacity, number of rounds and dimensions of magazine/ cylinder and chamber. 6 rds, 40mm X 6.25 in
(6) Safety type, location, indication method, misfire advance. Push Button safety,
(7) Sights type/description. Occluded sight Red Dot, Day/Night sight.
(8) Accessories, manuals and tools supplied.
a. Cleaning kit
b. Tool kit
c. Basic tools and cleaning kit
d. Sling
e. User and Repair Manual

(b) (4)



c. Photographs are included in Appendix C.

4. TEST PROCEDURE

Tests were conducted in the approximate order in which they are listed in this test report. Systematic observations and analyses of the item were conducted throughout all phases of testing to identify and investigate any actual or potential hazards to personnel and equipment that may result from operation and maintenance of the item by representative users.

4.1 PRELIMINARY FUNCTIONAL TESTS

These tests were completed prior to live fire testing of MSGL to ensure safety and functionality of MSGL.

4.1.1 Safety Selector Test

A safety selector test was conducted to determine if the weapon and the function of the safeties is reliable and can be manipulated by a shooter wearing tactical gloves, NBC gloves and cold weather mittens.

4.1.1.1 Evaluation Procedure

The following safety selector test procedure will be followed with the test weapon unloaded at all times:

1. Place the safety selector in the SAFE position with the test weapon cocked, and conduct a minimum of 10 dry firing attempts to intentionally override the safety.
2. Place the safety selector between the SAFE and FIRE positions and repeat step (1).
3. Inspect MSGL, determine if the operator can verify the safety selector position by touch as well as sight. Repeat using gloves, NBC gloves and cold weather mittens.

4.1.1.2 Data Reported

Safety selector tests were completed prior to tactical firing.

Safety selector worked as required.

(b) (4)

No issues were noted that prevent safe operation while wearing gloves or mittens.

4.1.2 Misassembly Test

A misassembly test was not conducted.

4.1.3 Parts Interchangeability

Parts Interchangeability Test was not completed.

4.1.4 Tactical Firing Test

A limited tactical firing was conducted following safety inspections (b) (4)
(b) (4)

Limited tactical firing was done to determine reliability of functioning of the B546 HEDP ammunitio (b) (4)

(b) (4)

4.2 ENVIRONMENTAL TESTING:

The environmental tests were not conducted on the Penn Arms MSGL.

5. LIMITED USER EVALUATION

Limited User Evaluation was not completed for the Penn Arms MSGL.

6. PRESENTATION OF DATA

Limited Testing was completed for the Penn Arms - Multi-Shot Grenade Launcher.

Environmental testing and the Limited User Evaluation were not tested.

(b) (4)

Inspections Data Card

date 6/15

Test Item Description		Test Procedure Number	
Serial Number	05A01		

Safety Selector Test

(b) (4)

Disassembly / Misassembly

(b) (4)

Parts Interchangebility

Inspections Data Card

date_____

Test Item Description		Test Procedure Number	
Serial Number	0545		

Safety Selector Test

Disassembly / Misassembly
(b) (4)

Parts Interchangeability

Inspections Data Card

date 6/15

65 A c 4

(b) (4)

(b) (4)

(b) (4)

(b) (4)

(b) (4)

(b) (4)

(b) (4)

(b) (4)

Ammunition Compatibility Test Data Card

date 15 Jun 05

Test Item Description	M204	Test Procedure Number	
Serial Number	05A04		

Date:	Time:	Condition:	Round Type	Number of Rounds:	TIR: If Applicable
8/15	13:30	New	HEDP	(b) (4) [redacted]	
			[redacted]		

– Test for HEDP compatibility

EVALUATION PROCEDURE FOR THE MULTI-SHOT GRENADE LAUNCHER

13-MAY-05

VERSION A

DISTRIBUTION STATEMENT D

Distribution of this software documentation is authorized to the Department of Defense (DoD) and U.S. DoD contractors only. Other requests for this document shall be referred to the Commander (Attn: Program Manager for Infantry Weapons), Marine Corps Systems Command, Quantico, Virginia 22134-5010.

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DOCUMENT REVISION HISTORY

Date	Version	Description
13-May-05	A	Original draft.

APPROVAL AND AGREEMENT

This is a controlled document maintained by the Team Leader for the Ordnance Test Facility at Marine Corps Systems Command (MCSC). No changes to this document may be incorporated other than those implemented via established KMP Configuration Management (CM) procedures. The undersigned concur with the information contained within this document.

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TABLE OF CONTENTS

1. INTRODUCTION

1.1 PURPOSE

This Test Evaluation Procedure provides procedures and techniques that will be used to evaluate the Multi-Shot Grenade Launcher (MSGL) in order to determine best value and verify that it is safe for use by operational forces.

1.2 OBJECTIVES

The objective of this test is to enable the Program Manager, Infantry Weapons Systems to make an informed decision on the down selection of an MSGL to meet the desired characteristics as outlined by the Urgent Needs Requirement from MCCDC.

1.3 SCOPE

The MSGL will be evaluated for safe and reliable functionality – during normal operating conditions as well as when subjected to adverse environmental conditions. The system will be tested in accordance with Ordnance Testing Facility (OTF) TOP/04/OTF/002 – Safety Evaluation Procedures for Hand and Shoulder Weapons.

Environmental testing will be conducted by OTF personnel. Environmental Testing will evaluate the MSGL for suitable operation and safe functioning in severe environments that the MSGL may encounter while employed. These tests include high and low temperature testing, salt-fog corrosive environments testing, and sand/dust and mud testing.

Reliability of the MSGL will be evaluated using a limited number of rounds. The MSGL will first be tested to demonstrate compatibility with the ammunition called out in the UNS. The MSGL will then be tested to a sufficient number of rounds to evaluate functional reliability to include the function of the round on the target (ie, does the HDP detonate).

1.4 CHAIN OF COUSTODY

Upon acceptance of the bid samples, a record jacket will be established for each sample. The record jacket will be cataloged by year, assigned alphabetical vendor letter and sample number. *Example; 05A01*
Within the first record jacket for each vendor there will be a worksheet that will be filled out that answers the questions that a technical board may require.
Within all record jackets will be a log sheet that will track the movement of the test article throughout the entire evaluation process.
The record jacket will also be used for a control of all worksheets or notes that are used during the evaluation process. All worksheets or notes will contain the control number that has been established during the acceptance phase.
All bid samples will be marked with a catalog number.

1.5 EVALUATION REPORT

The evaluation report shall be a separate document. One report will be established for the given sample type and shall consist of all test data, pass/fail criteria, error or variance calculations, interpretations and Test and Measurement Equipment calibration information (as required).

1.6 ACRONYMS AND AMMUNITION DODICS

The following are a list of acronyms and ammunition DODICs used throughout this document and evaluation:

Acronyms

DOD	Department of Defense
HEDP	High Explosive Dual Purposes
IWS	Infantry Weapons Systems
LUE	Limited Users Evaluation
MCCDC	Marine Corps Combat Development Command
MCSC	Marine Corps Systems Command
MRBF	Mean Rounds Between Failures
MRBS	Mean Rounds Between Stoppages
MSGL	Multi-Shot Grenade Launcher
NDI	Non Destructive Inspection
ORM	Operational Risk Management
OTF	Ordnance Test Facility
TEP	Test Evaluation Plan
TOP	Test Operating Procedure

DODICs

BA07 Foam rubber baton
BA08 Rubber ball
B508 Green smoke ground marker
B519 Training practice
B534 Multi shot projectile
B535 White star parachute
B546 HEDP
B567 C.S.

2. REFERENCE DOCUMENTS:

2.1 **TOP/04/OTF/002** – SAFETY EVALUATION PROCEDURES FOR HAND AND SHOULDER WEAPONS

2.2 **MIL-STD-810F** - ENVIRONMENTAL ENGINEERING CONSIDERATIONS AND LABORATORY TESTS

2.3 **URGENT NEED STATEMENT** –

2.4 PERFORMANCE SPECIFICATION FOR THE 40MM MULTI-SHOT GRENADE LAUNCHER

2.5 **FM 3-22.31 U.S. ARMY FIELD MANUAL - 40MM GRENADE LAUNCHER, M203**

3. FACILITIES, MATERIALS, AND INSTRUMENTATION

3.1 FIRING RANGE.

Firing of the MSGL will occur on a firing range at either Marine Corps Base Quantico, VA, or a suitable substitute.

3.2 TEMPERATURE CHAMBER

A Polar King temperature chamber will be used to condition test articles to temperatures ranging from 160°F (71°C) to -60°F (-51°C).

3.3 SALT FOG CHAMBER

An Auto Technology Company salt fog corrosion chamber will be used to do corrosive environment testing. The chamber includes data collection instrumentation.

3.4 DUST CHAMBER

An Envirotronics "D" Series Dust Chamber will be used to test the MSGL in a dust environment

3.5 INSTRUMENTATION

The following instrumentation will be used during testing:

3.5.1 **Dickson SM320:**

Data Logger will be used to record temperature measurements.

3.5.2 **Mannix DTH800:**

Digital Temperature/humidity Indicator will be used to measure humidity.

3.5.3 **Magnaflux:**

Magnetic particle inspection equipment will be used to examine metal components for surface cracks.

3.5.4 **Dye-penetrate:**

Dye-penetrate will be used to inspect non-metallic parts.

4. TEST PREPARATION

4.1 PRELIMINARY INFORMATION

4.1.1 Vendor Certification

The Vendors will provide certification of the following items prior to any government evaluations.

4.1.1.1 Proof Test:

The high-pressure test will be required prior to delivery to the US Marine Corps. The vendor will provide documentation that verifies the weapon is safe to fire and has been demonstrated by firing a high pressure round without catastrophic failure. The OTF will not attempt any tests that will affect the basic operation of the MSGL and will not require additional proof testing.

4.1.1.2 Lubricant and Cleaner Compatibility:

The vendor will certify that the system is compatible with standard weapons lubricants and cleaners.

4.1.2 Recoil Energy

Recoil energy of the MSGL will be calculated using the following formula as described in Reference 1.

Calculate the approximate recoil energy of the weapon. The following formula may be used when dealing in US customary units.

$$RE = \frac{W_g}{64.4} \cdot \left[\frac{\left(1.75 \cdot W_p + W_b\right) \cdot MV}{7000 \cdot W_g} \right]^2$$

where:

RE = Recoil energy for the gun (ft-lb). (for conversion to SI units, multiply by 1.356 to obtain joules)
W_g = Weight of the gun (lb).
W_p = Weight of the propellant (grains).
W_b = Weight of the bullet (grains).
MV = Muzzle velocity of the projectile (fps) – the highest allowable under commercial specification (SAAMI) unless measurements have been made.

NOTE: If the approximate recoil energy of a test weapon, when calculated in accordance with the above formula, approaches an unsafe level (approximately 60 ft-lb), or if precise data is needed to evaluate a specific application, the exact recoil energy should be measured using a ballistic pendulum prior to other test firings.

TABLE 1 – ROUND FIRING LIMITS FOR TEST WEAPONS

Computed Recoil Energy	Round Firing Limits
Less than 15 ft-lb (20.3 joules)	Unlimited firing
15 to 30 ft-lb (20.3 to 40.7 joules)	200 rounds/day/man
30 to 45 ft-lb (40.7 to 61.0 joules)	100 rounds/day/man
45 to 60 ft-lb (61.0 to 81.4 joules)	25 rounds/day/man
Greater than 60 ft-lb (81.4 joules)	No shoulder firing

4.1.3 Personnel

Test personnel will familiarize themselves with the technical and operational characteristics of the test item, as described in the applicable technical manuals, requirements documents, and/or manufacturer's literature. They will review any special warnings or safety statements prepared by the developer prior to conducting this test plan. Handling instructions of 40mm ammunition will be reviewed and proper handling of misfires will be briefed prior to a firing event.

4.1.4 Safety Release

The MSGL will require a safety release. An Operational Risk Management analysis will be completed and approved by the PM IWS for the MSGL and will be observed during testing.

The ORM analysis will be reviewed following testing and updated using lessons learned. The updated ORM analysis will be included as an attachment to the final report.

4.1.5 Weapon Examination and Inspection

The following examination procedure will be conducted prior to conducting any tests on the MSGL system.

a. Disassemble the MSGL and visually examine all major components (i.e. trigger mechanisms, locking arrangement, etc.) for conformance with specifications and design drawings if provided. Record any deviations from specifications.

b. Record the following for the weapon and its ancillary equipment, as applicable:

(1) Manufacturer.
(2) Nomenclature, model, and serial number.
(3) Length
(4) Weight
(5) Magazine/ cylinder capacity, number of rounds and dimensions of magazine/ cylinder and chamber.
(6) Safety type, location, indication method, misfire advance.
(7) Sights type/description.

(8) Accessories, manuals and tools supplied.
(9) Noted material discrepancies.
(10) Any actual or possible interference with the weapon's performance.

c. Photograph all discrepancies and interferences.

4.1.6 Test Controls

a. The MSGL will be tested in the most likely configurations and conditions in which it will be deployed and operated by the using community.
b. The MSGL will be tested using the ammunition listed in the UNS. Reference 2.3.
c. All precautions necessary to ensure the highest feasible degree of safety for test personnel and auxiliary equipment will be followed during all phases of the safety evaluation.
d. All range and facility safety Standard Operating Procedures will be observed throughout testing.
e. Any failures or hazards identified during any test phase will be corrected and retested before initiation of the next test phase.

5. TEST PROCEDURE

Tests will be conducted in the approximate order in which they are listed in this test procedure, although some flexibility is required to accommodate scheduling, priorities, breakdowns, etc. Systematic observations and analyses of the item will be conducted throughout all phases of testing to identify and investigate any actual or potential hazards to personnel and equipment that may result from operation and maintenance of the item by representative users.

5.1 PRELIMINARY FUNCTIONAL TESTS

These tests will be completed prior to live fire testing of MSGL to ensure safety and functionality of MSGL. Each of the functional tests will be reviewed by the test director prior to hand firing of the MSGL.

5.1.1 Safety Selector Test

A safety selector test will be conducted to determine if the weapon and the function of the safeties are reliable and can be manipulated by a shooter wearing tactical gloves, NBC gloves and cold weather mittens.

5.1.1.1 Evaluation Procedure

The following safety selector test procedure will be followed with the test weapon unloaded at all times:

1. Place the safety selector in the SAFE position with the test weapon cocked, and conduct a minimum of 10 dry firing attempts to intentionally override the safety.
2. Place the safety selector between the SAFE and FIRE positions and repeat step (1).

3. Inspect MSGL, determine if the operator can verify the safety selector position by touch as well as sight. Repeat using gloves, NBC gloves and cold weather mittens.

5.1.1.2 Data Required

The results of this test will be recorded. Any instances where the safety selector was overridden or the MSGL was made to fire inadvertently will be included in the test results.

Results of the safety indicator inspection will be included in the test results.

5.1.2 Misassembly Test

A misassembly test will be conducted to determine whether it is possible to assemble the MSGL incorrectly so that it can be caused to be fired in an unsafe condition.

5.1.2.1 Evaluation Procedure

The following procedure will be conducted for this test:

Inspect the MSGL and determine if there are any cases where the incorrect assembly of the MSGL can cause an unsafe condition. If there are any instances that misassembly of the MSGL may cause an unsafe condition the MSGL will be tested in this configuration.

(1) Assemble the MSGL in method to be reviewed.
(2) Chamber an inert round into the test weapon.
(3) Cycle the MSGL and ensure no interferences are present.
(4) Operate the safety and determine if interferences are present.
(5) Record any unsafe scenarios.

5.1.2.2 Data Required

The following information will be recorded for this test:

a. A description of any incorrect assembly modes that permitted or caused unsafe operation.
b. Whether it is possible to cause any catastrophic failure of the weapon by incorrect assembly.

5.1.3 Parts Interchangeability

The MSGL shall be tested for interchangeability of repair parts by disassembly and then reassembly. The MSGL must function without any failure.

5.1.3.1 Evaluation Procedure

a. Disassemble sample MSGLs. Label parts.
b. Mix parts from at least 3 samples.
c. Reassemble MSGL from a mixture of parts.
d. Test function the MSGL.
e. Record results.

5.1.3.2 Data Required:

a. MSGL serial numbers.
b. Parts exchanged.
c. Results of functional tests.

5.1.4 Tactical Firing Test

A tactical firing will be conducted if no safety hazards are detected during the inspections, and in the opinion of the test director, the shooter would be subjected to minimal risks. During live firing exercises, all shooters and adjacent personnel shall wear ear and eye protection equipment.

Prior to a live fire test event the test director will review the ORM matrix and brief the shooters on safe handling of the MSGL to include emergency procedures.

5.1.4.1 Evaluation Procedure:

The following procedure will be conducted for this test:

a. Conduct firing exercises from expected tactical firing positions. Fire a minimum of 18 rounds from each position, with stock extended and retracted, if applicable.
b. During the firing exercises, evaluate the following:
   (1) Ability to operate control devices (safety, cylinder release, cylinder spring preset, etc.) without difficulty.
   (2) Possibility of injury to the hands or fingers of the shooter when removing or inserting rounds, releasing the cylinder, etc.
   (3) Possibility of injury during recoil as a result of metal projections at hand-held positions or as a result of contact with moving parts such as operating rods.
   (4) Adequacy of hand guards to prevent contact with the heated barrel.
   (5) Automatic or manual ejection of expended cartridge cases.
   (6) Other human factors observations observed by the Test Director.

5.1.4.2 Data Required

The following information will be recorded for this test:

a. Mode of fire (single).
b. Tactical firing position (prone, standing, kneeling, etc.).
c. Attachments employed (sights, bipod, etc.).
d. Difficulties experienced during operation of control devices.
e. Potential injuries to the shooter when operating the test weapon.
f. Adequacy of the hand guards.
g. Adequacy of the ejection path of the expended cartridge cases.
h. Other human factors problems as observed by the Test Director.

5.2 ENVIRONMENTAL TESTING:

The following environmental tests will be conducted on the MSGL to determine how it will perform under extreme environmental conditions.

5.2.1 High Temperature Test

High temperature testing will be conducted to evaluate the effects of high temperature conditions on the safety, integrity, and performance of the MSGL.

5.2.1.1 Evaluation Procedure.

The following procedure will be conducted for this test:

a. Condition the test MSGL for a minimum of 4 hours to 160 ± 3°F (71 ± 1.5°C). This temperature correlates with what may be experienced in a Hot Dry temperature region as defined in MIL-STD-810F. This is considered to be the extreme high temperature that the MSGL may encounter in combat zones.
b. Fire a minimum of 18 rounds, using DODIC B519 or B577 training/practice device ammunition, from the MSGL at the conditioned temperature.
c. After firing, inspect the test MSGL for the following as applicable:
   (1) Cracks - using the NDI process as required.
   (2) Rust and deterioration.
   (3) Other observed weapon degradation.
   (4) Other observations observed by the Test Director.

5.2.1.2 Data Required

Testing data and observations will be recorded, including the following:

a. Temperature versus time data.
b. Results of functional test and live fire.
   (1) Number of rounds fired.
   (2) Type of ammunition tested.
   (3) Any malfunctions or failure of the safety devices.
c. Results of inspections.

5.2.2 Low Temperature Test

Low temperature testing will be conducted to evaluate the effects of low temperature conditions on the safety, integrity, and performance of the MSGL.

5.2.2.1 Evaluation Procedure

The following procedure will be conducted for this test:

a. Precondition the MSGL by thorough cleaning and lubrication using cold weather lubrication.

b. Condition the test weapon and ammunition for a minimum of 4 hours to -32 ± 3°F (-35 ± 1.5°C). This temperature correlates with what may be experienced in a Basic Cold temperature region as defined in MIL-STD-810F. This is considered to be the extreme low temperature that the MSGL may encounter in combat zones.
c. Fire a minimum of 18 rounds from the test weapon at the conditioned temperature.
d. After firing, inspect the test MSGL for the following as applicable:
   (1) Cracks - using the NDI process, as required.
   (2) Rust and deterioration.
   (3) Other observed weapon degradation.
   (4) Other observations observed by the Test Director.

5.2.2.2 Data Required

Testing data and observations will be recorded, including the following:

a. Temperature versus time data.
b. Results of functional test and live fire.
   (1) Number of rounds fired.
   (2) Type of ammunition tested.
   (3) Any malfunctions or failure of the safety devices.
c. Results of inspections.

5.2.3 Drop Test

Drop testing will be conducted to evaluate if the MSGL can physically and functionally withstand rough handling conditions – at ambient temperature conditions as well as at temperature extremes.

5.2.3.1 Evaluation Procedure

The following procedure will be conducted for this test:

a. Condition the weapon, inert rounds, and loaded magazine for a period of 4 hours at a temperature of 73 ± 3°F (23°C ± 1.5°C).
b. To perform the drop test, the MSGL should have an inert round chambered and a fully loaded magazine/ cylinder (4-6 inert rounds) in place. With the safety in the "safe" position, and the hammer in the cocked position, drop the rifle from a height of 5 ft onto a steel plate and/or concrete surface. Drop the MSGL such that the weapon impacted on each side, top and bottom, muzzle first and stock first various drop orientations may be repeated if desired by the tester.
c. Repeat step b after conditioning the rifle to temperatures of -32 ± 2.5°F (-35 ± 1.5°C) and 160 ± 2.5°F (71 ± 1.5°C) for periods of 4 hours each. This step may be coordinated with the high temperature and low temperature tests.
d. After the MSGL has completed each of the drop tests for the temperature condition, examine the MSGL for damage.

e. Inspect the MSGL for damage, determine if damage will cause the MSGL to cease to function or cause an unsafe operating condition.

5.2.3.2 Data Required

The following information will be recorded for this test:

a. Drop conditions and orientation.
b. Condition and functionality of the MSGL after each drop orientation.
c. How the MSGL performed when operated, extended or retracted.
d. Inspection results and other observations.

5.2.4 Salt Fog Test

Salt fog testing will be conducted to determine the effectiveness of protective coatings and finishes on the MSGL and to determine the effects of salt deposits on the physical aspects and operation of the MSGL.

5.2.4.1 Evaluation Procedure

The following procedure will be conducted for this test:

a. Clean and lubricate the MSGL, then live fire the MSGL a minimum of 6 times, to establish an "outside of its shipping/ storage container and set up in its normal operating mode". Do not clean or lubricate after operation.
b. Precondition the MSGL to 95 ± 3°F (35 ± 1.5°C) for approximately 12 hours.
c. Prepare a salt fog chamber – the salt fog should be generated from a 5 ± 1 percent saline (NaCl) solution produced by dissolving 5 parts of salt in 95 parts (by weight) of distilled water.
d. Place the MSGL horizontally in the salt fog chamber. The MSGL should have the attachments retracted for at least one sample and extended for at least one sample if the MSGL is equipped with a retractable stock or sighting system.
e. Condition the test MSGL for a minimum of 48 hours in the salt fog chamber.
f. Remove the MSGL and inspect at 24-hour intervals. The chamber temperature should be maintained at 95 ± 3°F (35 ± 1.5°C).
g. At the end of 48 hours, remove the MSGL and inspect for damage or material deterioration.
h. Functional test each MSGL. Record results.
i. Repeat this test if time permits.

5.2.4.2 Data Required

The following information will be recorded for this test:

a. Temperature and humidity data.
b. Mid- and post-test test article condition.
c. Results of each functional test.
d. Other relevant observations.

5.2.5 Sand & Dust Test

Dust testing will be conducted to evaluate if the MSGL can be stored and operated in a high dust environmental condition without degrading performance, effectiveness, reliability, and maintainability clogging effects of particles. Dust testing will be conducted to evaluate the ability of the test article to resist the effects of dust that may obstruct openings or penetrate into cracks and joints.

5.2.5.1 Evaluation Procedure

The following procedure will be conducted for this test:

a. Create a dust mixture by mixing the materials by weight percentage to be consistent with the MIL-STD-810F silica dust.
b. Clean and lubricate the MSGL, then live fire the MSGL a minimum of 6 times, to establish an "outside of its shipping/ storage container and set up in its normal operating mode". Do not clean or lubricate after operation.
c. Place the MSGL in the conditioning chamber.
   (1) MSGL unloaded and in carry configuration.
   (2) MSGL loaded with inert rounds. Safety selector on.
d. Condition the MSGL for a minimum of 48 hrs – by injecting the dust at a rate of 6 grams/meter^2/24 hrs.
e. Remove the MSGL from the chamber and wipe clean with bare hands.
f. Attempt to operate the MSGL.
g. Inspect the MSGL for damage or material deterioration.

5.2.5.2 Data Required

The following information will be recorded for this test:

a. Time in dust environment.
b. Dust dispensing rate.
c. Results of the operational trial.
d. Inspection results and other observations.

5.2.6 Mud Test (Wet & Dry)

Mud testing will be conducted to determine if the rifle performs safely when exposed to a mud environment.

5.2.6.1 Evaluation Method

The following procedure will be conducted for this test:

a. Create a mud mixture by mixing 10 lb of montmorillonite clay, 2 lb of silica sand, and 48 quarts of water together.
B, Clean and lubricate the MSGL, then live fire the MSGL a minimum of 6 times, to establish an "outside of its shipping/ storage container and set up in its normal operating mode". Do not clean or lubricate after operation.
c. Cover muzzle.

d. Place the rifle horizontally into the prepared mud mixture. The weapon should be loaded with an inert round, the magazine in place (loaded with five inert rounds), the bolt closed, and the safety in the "on" position. Immerse the rifle for 60 seconds.
e. After immersion, wipe the rifle with a bare hand – crudely cleaning the weapon.
f. Attempt to "fire" at least 5 inert rounds with the weapon.
g. If the attempt is unsatisfactory, immerse the entire rifle and contaminated ammunition in clean water and agitate as rapidly as possible for 60 seconds. Attempt to "fire" the weapon. If firing is still unsatisfactory, immerse the entire weapon and contaminated ammunition in water again for 60 seconds, and agitate as rapidly as possible. Attempt to "fire" the weapon again. If no malfunctions occur that cannot be readily cleared by immediate action, continue the test until all ammunition is fired. If functioning continues to be unsatisfactory, stop the test.
h. Repeat steps b through g of this test, except this time let the weapon and ammunition dry at 67 ± 18°F (21 ± 10°C) after completing step e. Let dry for at least four hours before continuing to step f.

5.2.6.2 Data Required

The following information will be recorded for this test:
a. Results of each firing attempt.
b. Inspection results and other observations.

5.3 TARGETING AND ACCURACY

Accuracy of the MSGL will be tested to verify it is as good or better than the accuracy requirement of the M203 Grenade Launcher.

The accuracy requirement of the M203 Grenade Launcher is described in Section 3.3.3.2 of FM 3-22.31 which is included as Reference 5.

Summarized: the requirement is that the MSGL will be capable of hitting a rectangle target that measures 36.6 meters in range and 6.38 meters in deflection from a distance of 200 meters.

5.3.1 Evaluation Procedure:

The accuracy will be verified using the FM 3-22.31 40mm Grenade Launcher M203 Section 5-10 Overall Qualification Standards, 40mm Grenade Launcher Scorecard DA Form 2946-R, for each shooter, shooting each MSGL being tested and the M203 for verification.

a. Verify the MSGL and the M203 are serviceable and ready to fire.
b. Shooter #1 will fire the qualification course using the M203, Record results and score.
c. Shooter #1 will repeat the qualification course using the MSGL, record results.
d. Repeat until Shooter #1 has fired the course with each MSGL being considered.
e. Repeat for a minimum of three shooters.

5.3.2 Data Required

Data will be collected during each of the qualification courses of fire.

The following data will be collected from each course of fire:

1. Shooter scorecard for each weapon.
2. Environmental conditions, date, time of day, weather, wind.
3. Observations, shooter difficulties.
4. Stoppages or failures.

5.4 RATE OF FIRE

Rate of fire will be demonstrated using training rounds. The shooter will fire a full magazine/ cylinder as quickly as possible while aiming at an area target. Total time will be recorded from the first round fired to the last round fired and the total time will be divided by the number of rounds fired not counting the first round fired (if 6 rounds are fired, divide time by 5 to get average time).

5.4.1 Evaluation Procedure:

The following procedure will be conducted for this:

a. Verify the MSGL is serviceable and ready to fire. If necessary clean and lubricate prior to test.
b. Load MSGL with a full load of TP rounds.
c. Aim the MSGL at a suitable target, await command to fire from the test director/monitor.
d. Monitor will prepare to record time and give the command to fire.
e. Time will start when the first round is fired.
f. Time will stop when the last round is fired.
g. Record time, record and incidents/malfunctions or misfires.
h. Repeat test.

5.4.2 Data Required

The following information will be recorded for each course of fire:

a. MSGL Manufacturer/model
b. MSGL serial number.
c. Shooters name
d. Environmental conditions.
e. Recorded time.

5.4.3 Ammunition Compatibility

The MSGL will be tested to demonstrate the ability to fire a mix of ammunition types in the same magazine/ cylinder load. Three scenarios will be tested. First scenario will be mixed HEDP

and signal smoke. The second scenario will be non-lethal Rubber baton, rubber ball and wooden baton. The third scenario will be HEDP and illumination flares.

5.4.3.1 Evaluation Procedure

The following ammunition procedure will be followed.

a. Verify the MSGL is serviceable and ready to fire. If necessary clean and lubricate prior to test. Number chambers in magazine.
b. Load MSGL with a full magazine/ cylinder consisting of a mix of rounds from the ammunition list.
c. Aim the MSGL at a suitable target; await command to fire for test director/monitor.
d. Monitor will prepare to record information and give the command to fire.
e. Repeat until all DODICS are fired or attempted to be fired.
f. Record incidents/malfunctions or misfires.

5.4.3.2 Data Required

The following data will be recorded.

a. Weapon Model and serial number
b. Magazine/ cylinder load
c. Record any malfunctions, incidents or failures.

5.4.4 Attitude and Feeding Test:

The MSGL will be tested to verify reliable feeding when fired in top-up, top-down, right side up, left side up, vertical muzzle up, and vertical muzzle down.

5.4.4.1 Evaluation Procedure:

The following procedure will be conducted for each of the test weapons.

NOTE: Care must be taken to trap the projectile when weapon is tested in vertical orientation. Muzzle may be rotated off of vertical if necessary for safety during testing. Record and deviation from vertical.

a. Clean and lubricate MSGL.

b. Load MSGL with one full magazine/ cylinder of DODIC B519 and fire in each of the following orientations.

(1) Top-up
(2) Top-down
(3) Right-side up
(4) Left side up
(5) Muzzle up

c. Record any malfunctions.

5.3.1.2 Data Required:

a. Weapon serial number.
b. Record any malfunctions.

5.5 RELIABILITY

The MSGL will be evaluated to determine reliability.

The reliability will be evaluated based on MRBF, MRBS and the Reliable function of the round on target.

Mean Rounds Between Failure is defined as the number of failures divided by the total number of rounds attempted to be fired, where a failure is defined as:

1. any stoppage that cannot be corrected by the operator within 20 seconds.
2. any stoppage requiring the replacement of parts to correct.
3. any failure to make the round function properly.

Mean Rounds Between Stoppage is defined as the number of stoppages divided by the total number of rounds attempted to be fired, where a stoppage is defined as any incident resulting in an unplanned cessation in firing or inability to commence firing. This includes stoppages traceable or chargeable to an unserviceable part.

Reliability to function will evaluate the reliability of the MSGL to function the round on impact. The 40mm projectile is intended to have an end effect of either High Explosive detonation, smoke or illumination. The reliability of the end effect is affected by the MSGL and will be recorded as a failure for the MTBF as well as a separate reliability calculation. Reliability will be calculated for each ammunition type to be evaluated.

This program has an Urgent and Compelling need and the reliability testing will be abbreviated to minimize the time and expense of testing while ensuring a safe and effective product is delivered to the Marines. For the purpose of this evaluation there will be a limited reliability test completed and reliable function will be demonstrated for each DODIC type listed in the UNS. To demonstrate reliable function a minimum of 18 rds for each type will be fired without stoppages. If stoppages are recorded or failures of the ammunition to function are recoded a sufficient number of rounds will be fired to determine the cause of the malfunction or a trend is identified and the MTBF can be determined. Any rounds fired during previous testing will be included in the reliability analysis. For planning purposes the DODIC B546 will be tested to a minimum of 300 rounds due to the sensitivity of the rounds and the critical need for reliable function.

5.5.1.1 Evaluation Procedure

a. Evaluate live firing to date and determine number of rounds fired by each MSGL and the remaining number of rounds for each ammunition type to reach minimum allowable for each DODIC.
b. Fire the table of ammunition to verify proper functioning of each ammunition type. At a minimum each type will be fired from each shooting position and the MSGL shall be

fired in multiple orientations to verify the MSGL is not susceptible to malfunction do to orientation or shooting position.

c. In the event there is a misfire or failure of the round to function the minimum number of rounds for the DODIC or ammunition type will be increased to 100 rounds if ammunition is available. For planning purposes the DODIC B546 will be tested to a minimum of 300 rounds due to the sensitivity of the rounds and the critical need for reliable function.
d. Repeat as necessary to determine the cause of the malfunction or to develop a large enough samples to be able to judge the reliability with a confidence level of 90%.

5.5.1.2 Required Data

The following data will be recorded:

1. Weapon Serial Number.
2. Type and lot number of ammunition.
3. Number of rounds fired.
4. Number of malfunction, failures or stoppages.
5. Detailed description of any failure, stoppage or malfunction.
6. Calculated reliability from sample size.
7. Comments from the shooter or test director.

5.6 LIMITED USER EVALUATION.

The limited users evaluation is appendix A of this document.

5.7 POST-TEST INSPECTIONS

Upon completion of all preliminary evaluation tests, and again after all performance and reliability tests, a post-test inspection will be performed.

5.7.1 Evaluation Procedure

The following procedure will be conducted for this test:

a. Disassemble the test MSGL and visually examine all major components.
b. Conduct a NDI inspection of components as required.

5.7.2 Data Required

Results of the visual, magnetic particle and dye penetrant inspections will be recorded.

6. PRESENTATION OF DATA

For the purpose of data presentation, the following actions will be taken after all tests have been conducted and the results recorded:

a. A separate test report will be presented for each vendor supplied test article.

b. All data will be tabulated and compared with established criteria.
c. Based on data recorded during preliminary safety tests, a safety release recommendation will be prepared for submittal to Infantry Weapons Systems Directorate, MARCORSYSCOM, as required.
d. All results and safety information generated during the tests conducted in accordance with this TEP will be assembled and tabulated into a test report. All observed hazards or discrepancies will be described and assigned a category of hazard level. The conditions of use under which each hazard was observed will be reported, and any features that require further investigation will be described, including any hazards that could occur or increase as a result of increased operating hours.
e. All performance data will be presented in the test report and any comparisons will be limited to comparison of the test article to the evaluation procedure. No direct comparison or reference will be made from one vendor's test article to another.

APPENDIX A: Limited User Evaluation

1) Squad Offense (Day and Night) - Range 5

2) Convoy Fires – Range 5

3) Accuracy - Range 5

6.1.1 Squad Offensive Evaluation

The MSGL will be evaluated for its ability to be integrated into the mission profiles of the Marine Rifle Squad. A squad equipped with MSGL will conduct day and night blank fire attacks across a danger area.

6.1.1.1 Evaluation Procedure

1) The squad will be issued with blank 5.56 ammunition and a mixture of 40mm TP and illumination rounds.
2) The squad will conduct two daytime attacks.
3) The squad will conduct two nighttime attacks.
4) Squad members who employed the MSGL in the attacks will fill out questionnaires regarding system performance.

6.1.1.2 Data Required

1) Weapon type and serial number
2) Shooter biographic information
3) Any incident reports gathered during the evolution
4) Questionnaire responses

6.1.2 Convoy Fires Evaluation

The MSGL will be evaluated for its ability to be integrated into the mission profiles prevalent in the OIF Area of Operations. Shooters equipped with MSGL will conduct break-contact type fires from a moving HMMWV.

6.1.2.1 Evaluation Procedure

1) MSGL shooters will be issued with 40mm TP rounds.
2) Shooters will embark HMMWV.
3) Each shooter will engage designated target from the port side of the vehicle on one pass.
4) Each shooter will switch seats and engage designated target from the starboard side of the vehicle on the next pass.
5) Marines who employed the MSGL will fill out questionnaires regarding system performance.

6.1.2.2 Data Required

1) Weapon type and serial number
2) Shooter biographic information
3) Any incident reports gathered during the evolution
4) Questionnaire responses

6.1.2.3 Accuracy

The MSGL will be evaluated for its ability for users to accurately engage targets at various distances.

6.1.2.4 Evaluation Procedure

1) MSGL shooters will be issued with 40mm TP rounds.
2) Shooters will engage targets in accordance with the M203 qualification course of fire as per FM 3-22-31.
3) Marines who employed the MSGL will fill out questionnaires regarding system performance.

6.1.2.5 Data Required

1) Weapon type and serial number
2) Shooter biographic information
3) Any incident reports gathered during the evolution
4) Questionnaire responses